The Economic Integration of Roman Italy

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The Economic Integration of Roman Italy

Rural Communities in a Globalizing World

Edited by

T.C.A. de Haas
G.W. Tol

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Cover illustration: Reconstruction drawing of the 2nd/1st century BC rural site of San Martino in southern Tuscany. Image courtesy of Studio InkLink.

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Introduction

Gijs Tol and Tymon de Haas

The volume that lies before you constitutes the proceedings of a two-day conference held in late November 2013 at the Royal Dutch Institute in Rome. The conference took place in the context of the five-year research project '*Fora, stationes* and sanctuaries: the role of minor centres in the economy of Roman Central Italy' (in short: the Minor Centres Project). This project, itself part of the University of Groningen's long-running Pontine Region Project,[1] aims to investigate the role of minor centres or nucleated non-urban sites in the settlement system and economy of Roman Italy.[2] The purpose of the conference was to provide us with critical feedback and contextualization of our own research on rural economies, which uses approaches common in landscape archaeological studies, within the broader field of studies on the Roman rural economy. Over the past decades this field has witnessed much new and innovative work in which high-quality data have been generated, novel approaches have been developed, and where archaeological and ancient historical scholarship have increasingly converged. This introduction highlights the main methodological and conceptual advancements that have been made in the field and subsequently discusses some key themes within this general development as reflected by the chapters in this volume. Although these key themes are relevant for rural landscapes throughout the Roman world, this introduction and the volume as a whole concentrate on the countryside of Roman Italy, reflecting the geographic focus of the Minor Centres Project itself.

1 The Study of Roman Rural Economies: Status Quo

Substantial archaeological fieldwork, starting in the 1950s and booming from the 1970s onwards, continues to enrich our view of the Roman countryside and rural economies.[3] Excavations, whether in the context of rescue operations or of scientific projects, have contributed to a better understanding of the range

1 Attema (1993); Attema et al. (2010); Attema et al. (2011).

2 See Tol et al. (2014) and Santoro (this volume) for a discussion of the term.

3 The term 'rural economies' here refers to economic activities taking place in the countryside irrespective of its relation to urban centres.

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and complexity of rural settlement.[4] In addition, an ever-growing number of field survey datasets allows us to reconstruct local and regional trajectories in settlement and economy for many parts of Roman Italy and the wider Roman world.[5]

Not only the amount, but also the quality and diversity of data have increased substantially with the introduction of new field methodologies and analytical techniques. In the context of landscape archaeology, we may point to the rise of intensive off-site field methods and, more recently, the widespread application of geophysical prospection and geo-archaeological and palaeo-environmental studies. In excavations of Roman rural sites, we witness a shift of interest from the larger and richer sites (e.g. villas) towards an exploration of also smaller and more ephemeral establishments. Methods such as ecological sampling are gaining ground, whereas advancements in digital recording, such as photogrammetry, allow careful documentation and analysis of excavated sites. Similarly, the availability of new, and relatively cheap, scientific techniques in material culture studies, such as handheld XRF, open up new avenues of research.

Recently acquired archaeological data have allowed us to increase our understanding of rural economies in two main ways. First, while interpretations of sites and regions were traditionally based on a restricted range of evidence, these can now be enriched by integrating different types of high quality data, ranging from regional palaeogeographical and climatological data to site-based artefactual and ecofactual evidence from excavation. Such integration, although methodologically challenging, has the potential to enhance and indeed transform our understanding of rural sites, landscapes and regions. To give an example, field surveys produce comprehensive sets of dots on maps, presumably representing farms and villas and by implication productive agricultural landscapes. Although extremely useful, such maps are also problematic in that they mask a much more complex and dynamic reality, with different agricultural activities taking place at multiple locations rather than just one, and also involving non-agricultural activities (e.g. ceramic production, storage) that may not be easily traceable using traditional survey methods.[6] A systematic integration of survey evidence with geophysical, geo-archaeological and

4 One obvious advance has been the growing number of excavated farms, as presented on Fasti and its associated online journal Fold&r (http://www.fastionline.org/folderindex.php?view=serieshome&ste_cd=FOLDER-it, accessed April 7th 2015). See also Rathbone (2008) and Kron (this volume).

5 See contributions in Attema et al. (2002); Alcock and Cherry (2004a).

6 Cf. contributions in Attema and Schörner (2012).

ecological data is therefore crucial to better understand the range of site types present, as is more detailed investigation of the actual activities and agricultural strategies that took place.[7]

Second, as robust and rich regional datasets are amassing, we can start to compare them in order to produce supra-regional syntheses of developments in rural settlement and economy that allow the identification of both general trajectories and regionally and micro-regionally specific socio-economic and demographic developments.[8] While practical challenges relating to data integration and interpretation are still considerable, systematic comparisons of site densities, typologies and chronologies, off-site distributions, and the circulation of individual ceramic wares and shapes have become within reach. Such comparative analyses will enable us to evaluate regional variations in agricultural strategies, non-agricultural activities and connectivity in light of Roman territorial expansion and economic development and integration.[9] By putting archaeological datasets at centre stage, historians and archaeologists alike have begun to re-address the grand debates in ancient economic history.[10] By systematically analysing archaeological data in light of concepts such as connectivity, globalization, integration and economic growth and performance, a much richer and more complex picture is emerging of how the expansion of Rome's power in the Mediterranean transformed both social relations and economic systems.[11]

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7 As is well illustrated by the Excavating the Roman Peasant Project; see Bowes et al. (this volume); Ghisleni et al. (2011); Vaccaro et al. (2013).

8 For one such attempt, see Witcher (2006a).

9 Leitch (2013); see also Tol (this volume).

10 The historical debate is still greatly indebted to the works of Moses Finley (1973) and Keith Hopkins (1978a). In their wake, historians have long sought to characterize the Roman economy in terms of its supposed primitivist or, conversely, modernist character, with a particular emphasis on the implications for rural demographic developments (cf. the so-called High Count—Low Count discussion) and modes of production. The use of archaeological data in support of such views has generally been limited, although archaeologists have long tended to concentrate on specific types of rural settlement (e.g. villas), and have sought to interpret these in specific (Marxist) frameworks; see e.g. Carandini (1985a) and (1989a).

11 On socio-economic and demographic developments, see Launaro (2011a) and De Ligt (2012a). For the use of archaeological data as proxies for economic performance and growth, see Bowman and Wilson (2009a) and *Facta* 5 (2011); on the concepts of globalization, connectivity and integration, see Pitts and Versluys (2015) and contributions therein; Scheidel (2014). See also Jongman (this volume) and Feinman (this volume).

The contributions to this volume form a clear reflection of the developments outlined above. They present research carried out by both ancient historians and archaeologists of various backgrounds; they present both new data and new methodologies as well as fresh synthetic perspectives on existing datasets from different parts of Roman Italy. They also discuss different analytical scales, ranging from the single site to the entire Roman peninsula and illustrate well the two trends (the integration of data types and the comparison and synthesis of datasets) signalled above. We hope that together they demonstrate the potential of multi-method, multi-disciplinary and multi-scalar approaches, which in our view are key to a better understanding of the Roman rural economy.

Roughly following the thematic set-up of the conference, we have arranged the chapters around three key aspects of rural economies: agricultural production and socio-economic developments, crafts and commercialization (discussed in parts 2–4).[12] They are preceded by three chapters (part 1) that discuss the broader economic, social and geographic context in which the Roman rural economy developed, and are followed by two chapters that reflect on the main issues discussed in the volume (part 5).

2 The Economic Integration of Rural Communities: The Economic, Social and Geographic Context

Whilst we have briefly sketched the context in which the contents of this volume should be considered, three chapters discuss aspects of this wider setting in more detail.

In the first chapter, economic historian Willem Jongman emphasizes the crucial role of archaeology to provide the (aggregate) data necessary to address some of the main long-term developments (demography, economic (*per capita*) growth and decline) relevant to historical studies in general and to the Roman period in particular, presenting several examples to demonstrate this potential. At the same time, he reminds us that the rise and apex of the Roman economy, the main focus of the contributions in this volume, are not the only subjects worthy of study, but that its decline deserves equal attention.

12 Some (or even many) of the papers address two or even all three of these themes. We have placed these under the theme to which we felt they contributed most.

The other two contributions in this section place the processes of economic integration of the Italian countryside into a broader socio-economic and geographic context. In his chapter, Rob Witcher uses Michael Woods' concept of the 'global countryside' and its main characteristics to study the character and development of rural landscapes in Roman Italy. By zooming in on two socio-economic issues, community and connectivity, he argues against the definition of a single Roman countryside. Instead, he emphasizes that different local and regional trajectories towards rural integration occurred, being influenced by different push-and-pull factors working on diverse societal scales.

A similar conclusion is reached by Tymon de Haas using an economic-geographic perspective. By focusing on the economic processes of demand, distribution, circulation and production (both agricultural and non-agricultural), he argues that local and regional geographic conditions, the distribution of population, the characteristics of infrastructural networks and the availability of natural resources, provided differential potential for rural economic development and integration. At the same time, the available data seems to suggest that in both core areas and more remote regions rural populations became integrated into supra-regional exchange systems, albeit in different ways.

Together these contributions illustrate two things: first, how the study of the Roman rural economy can benefit from applying perspectives from other, related disciplines (e.g. economic geography, the social sciences); and second, that based on theoretical considerations and presently available archaeological data, we should indeed expect Roman rural communities to have been characterized by overall high levels of economic integration, although the level and pace with which this occurs may vary considerably according to local circumstances.

3 Theme 1: Agricultural Production and Socio-Economic Developments

Agriculture, as the primary economic sector, has traditionally been the main object of investigation in studies of Roman rural economies and other complex pre-industrial societies. Our understanding of Roman agriculture has long relied primarily on historical evidence: excavation data served to illustrate the historical models of agricultural production,[13] and the study of agricultural practices themselves was based primarily on information derived from written

13 Giardina and Schiavone (1981).

sources.[14] As such, agricultural studies have somewhat lagged behind the ecological approaches that have long been common in the study of other regions and periods. However, a recent increase in the systematic use of archaeozoological and botanical data is now producing new insights in (pastoral and arable) land use, crop choices, and complementary activities such as game farming and sylviculture. Such data in turn inform us on the production strategies of both small farmers and large estate holders and the extent to which these were part of market-oriented production systems. The four chapters of part 2 use different analytical scales (from a single site to a region) and deal with different source materials (literary, botanical, artefactual) to illustrate the potential of archaeological data to address these issues.

In his contribution, Alessandro Launaro provides an excellent example of how the integration of regional archaeological datasets can help to revise long-standing socio-economic models of the Roman rural economy. By combining the results of a number of survey projects he challenges the widely held view that the rise of large (slave-based) villa estates, observable in many parts of Italy from the 2nd century BC onwards, occurred at the expense of the local peasantry. On the contrary, the ubiquitous increase in the numbers of large villa estates throughout Italy that emerges from Launaro's study appears to have been accompanied by stabilization of or even an increase in the number of recorded farmsteads. A rise in the number of villa estates is only one of the effects (along with urban embellishment in towns and villages) of a period of increased wealth among elites, which may have trickled down to lower social strata.

Based on very different data (zoological assemblages from farm and villa excavations), Geoffrey Kron likewise identifies a growing prosperity of both elite estate holders and owners of small to medium-size farms and emphasizes their interdependence in meeting the demands of both urban and rural markets. Whereas small farmers possessed extensive knowledge of local market and farming conditions and could occasionally be hired as labour, wealthier farmers were in a (financial) position to take more risks, which stimulated innovation. Kron discusses game farming as an example of such an innovation. After initially having been the domain of a few elite landowners, the market for game expanded over time and game production intensified, thereby coming within the reach of different echelons of society.

14 E.g. White (1970); Spurr (1986).

The next two chapters both illustrate the substantial potential of environmental, and particularly botanical research to advance our understanding of how farmers adapted their agricultural strategies according to differing geographic and economic conditions. Frits Heinrich discusses crop selection strategies in Roman Italy as compared to other parts of the Roman Empire. Botanical evidence suggests that a shift from emmer to hard wheat took place in the grain-producing regions of the Empire, stimulated by the favourable properties of the latter in terms of cultivation, transportation and processing. In contrast, crop chronologies suggest that Italian farmers adopted a more balanced, and less risky, strategy of producing multiple crops, and that they were less inclined to select crops on the basis of productivity-related factors only. Heinrich relates these strategies to the relatively favourable market conditions for Roman farmers, who were exempt from taxes and resided in close proximity to the major markets, which would have led to a greater emphasis on high-value cash crops and allowed smallholders to engage in economic activities of a non-agricultural nature. He acknowledges that he is largely constrained to use botanical data that derives from urban rather than rural contexts and that the collection of data from such rural production contexts will be crucial to test these hypotheses.

In this light, Kim Bowes et al. present important new work undertaken in the context of the Roman Peasant Project. Excavation of five small sites (identified during previous surface surveys), thought to constitute lower-class rural households, revealed a wide range of activity areas, including field drains and temporary shelters; remarkably, only one could be interpreted as a permanent habitation site. Together, the evidence points to a period of agricultural intensification during the Late Republican and Early Imperial period. Systematic botanical sampling suggests that convertible agriculture may have been an important agricultural strategy in this period. At the same time, the excavation data warn against the uncritical use of survey data for site classifications and, by extension, demographic calculations. Also, they problematize the common assumption that agricultural regimes were uniform throughout a region. Their work thus shows that detailed local studies are crucial to critically evaluate attempts at generalization at larger spatial scales.

4 Theme 2: Crafts

While agricultural production has traditionally received much attention, other aspects of rural economies such as crafts, industries, and resource exploitation as well as the provision of services have remained poorly studied. As is clear

from the three contributions to part 3 of this volume, an understanding of the range of non-agricultural economic activities, their context, scale and organization is essential to assess the complexity and degree of development of rural economies.

A key area of research within this theme concerns the study of pottery production, which as the archaeologically most visible craft may serve as a proxy for the importance of other, archaeologically less visible, rural crafts.[15] The potential of ceramic studies (including a wide range of science-based approaches) is far greater than merely pointing out distribution patterns of well-known imported goods. Studying local production of ceramics and the distributional range and relative importance of such local productions can highlight intra-regional variability in economic connectivity, and solid empirical work to that effect is therefore urgently needed.[16]

In the first contribution, J. Theodore Peña presents a *status quaestionis* of the study of Roman rural pottery production. Peña defines a model that is based on locational characteristics and that distinguishes five types of craft production, three of which concern rural areas (rural town-proximate, rural town-distant, and mobile production). This is followed by a discussion of four case studies of rural manufacturing sites in order to illustrate the possibilities and limitations of the evidence at our disposal. The selected cases allow an evaluation of the range of production modes that are attested and of the markets served by rural pottery production. To conclude, the author identifies a number of promising avenues for future research.

The contribution by Vaccaro et al. presents an excellent illustration of the fact that our view of the Roman rural economy is far from complete and that there is still much to learn from local case studies. The authors discuss a remotely located rural pottery production site that was recently identified by the aforementioned Roman Peasant Project at Podere Marzuolo (Cinigiano, southern Tuscany). An integrated programme of non-invasive research, followed by small-scale targeted excavation on what was thought to be a rural central place, provided ample evidence for productive activities during the late 1st century BC and the 1st century AD, including the manufacturing of experimental and Italic Sigillata. This production ties in neatly with a period of rural intensification in the region (cf. the contribution by Bowes et al.). Laboratory analyses of local clays and pottery from surrounding areas are starting to reveal

15 Cf. Hodder (1974); for a good recent example focusing on the eastern Roman *Suburbium*, see Bertoldi (2011).

16 Cf. Tol (this volume); Tol and Borgers (2016).

that the ceramics produced at Podere Marzuolo were primarily destined for the expanding local market.

The contribution by Sara Santoro focuses on the economic functions of minor settlements in two Italian regions on the Adriatic coast, Abruzzo and Friuli. An analysis of the available archaeological and epigraphic evidence suggests that such minor settlements shared a strong productive component and played an important role as hubs in trade networks. The establishment of an integrated system of these mid-level sites in the two study regions appears to have been the result of a direct attempt by Rome to gain control over newly conquered territories, and was of eminent importance in the cultural, political and economic integration of these regions in the Roman State.

5 Theme 3: Commercialization

The third theme of the volume is commercialization and this section incorporates six chapters. Together they consider how rural areas became integrated into the wider Roman economy, as producers, through agricultural specialization and non-agricultural production, and as consumers through the importation of goods. The first three chapters of this part present regional case studies that highlight the interplay between production, trade and regional socio-economic developments. Focusing mainly on wine production and trade, they stress the importance of local dynamics and regional variability, but also outline several commonalities in the impact of Roman expansion in which a central role is presumed for local elites through their integration in Roman economic networks.

The first chapter by Gloria Olcese discusses the role of local elites in viticulture and wine trade in the Bay of Naples area by zooming in on evidence for amphora production on the island of Ischia. After its incorporation into the Roman State from the late 4th century BC onwards, a situation of mutual benefit arose; whilst the local producers and merchants profited from an expanded market (visible in the ubiquitous presence of Campanian amphorae throughout the Tyrrhenian coast), Rome had secured an important economic gateway towards the south.

Marinella Pasquinucci and Simonetta Menchelli present a case study from coastal North Etruria that similarly illustrates the local economic impact of Roman expansion. The authors draw on a wealth of archaeological and epigraphic data to suggest that the area's incorporation into Roman territory and the related efficient infrastructural networks, as in the case of the Bay of Naples, resulted in a well-defined and open system of interdependent markets. This

intense interconnectedness paved the way for a period of economic development that is best illustrated by the enormous success of the Pisan Sigillata industry.

Wine production is also the focus of the chapter by Dimitri van Limbergen et al. The authors discuss the development of viticulture in the Potenza Valley in the central Adriatic area during the Late Republican and Early Imperial periods. Integrating data on amphora production with demographic calculations, they challenge the widely held view that the flourishing Italian wine trade of the 2nd and 1st centuries BC, as evidenced by large numbers of amphorae of Italian origin documented outside Italy, largely collapsed in the Early Imperial period as a result of fierce provincial competition. Instead, the authors propose an alternative model for the area under study, in which local wine production continued but was redirected to local markets to meet the demands of a growing population.

The remaining three chapters in part 4 study different aspects of commercialization. They use diverse approaches to reconstruct economic integration, both at the regional and supra-regional level and on the basis of very different kinds of evidence.

In his contribution, Gijs Tol illustrates the potential of ceramic data from field surveys as a proxy for the study of regional economic histories, and especially trade networks. Using the comprehensive database of sites and finds generated by the Pontine Region Project, he compares consumption patterns of amphorae and fine table wares between the Republican period and Late Roman times to show that the Pontine region was overall well-connected. However, marked intra-regional differences in settlement and economic integration emerge between areas at the front end of the supply chain (e.g. the surroundings of the Roman harbour town of Antium and the site of Forum Appii, which was equipped with a river harbour) and those at the back end.

Next, Robyn Veal discusses an often-neglected component of the economy: wood consumption for fuel. As essential commodities in many crafts (e.g. metallurgy, pottery production) and domestic activities (cooking, heating), the market for both wood and charcoal must have been considerable, and production highly organized. Following up on previous work, Veal presents a model for the organization of fuel production that is based on data from Pompeii and evaluates its applicability for calculating the fuel requirements of the city of Rome. The evidence suggests that fuel production predominantly took place on medium to high mountain slopes, where environmental conditions were suitable for the preferred tree types, whilst avoiding the lower and more valuable agricultural soils in the plain.

In the final contribution in this part, Michael Crawford discusses the use of coinage in rural areas. Although research on rural landscapes has in recent decades produced ample documentation of the presence of coins on (even modest) rural sites, so far no solid evidence has been produced that these coins were also spent in rural areas. This strengthens the author in his claim (voiced already in the early 1970s[17]) that the use of coinage in commercial transactions was to a large extent an urban phenomenon, at least in the two centuries before and after the beginning of the Common Era.

6 Conclusions: Current State and Future Directions

The volume concludes with two chapters that reflect on both the contextual chapters in part 1 and the thematically grouped chapters of parts 2, 3 and 4.

Gary Feinman, on the basis of his studies of pre-industrial societies in China and Meso-America, provides an outsider's perspective on the current state of Roman economic studies as reflected in this volume. In line with the methodological observations made above, he lays out the elements of a multi-scale and cross-cultural approach as being necessary to better understand pre-industrial economies, including that of the Roman world, as well as the processes behind economic development over time and space.

In the final chapter, Peter Attema reflects on the contributions to this volume in light of theoretical and methodological developments in Mediterranean landscape archaeology. His contribution takes us back to the project from which this volume (and the conference mentioned above) arose. Positioning landscape archaeology as the principle field of study to understand rural economies, he stresses the need to integrate datasets and approaches to refine our understanding of rural economies, especially at the supra-regional scale.

Together, the contributions in this volume paint a picture of a Roman Italy whose economy (or economies) was complex and diverse and knew many local and regional developmental trajectories. Although these trajectories related to both local socio-economic and environmental as well as broader socio-political and economic contexts, a general increase in complexity and levels of integration over time seems to emerge. Clearly much work remains to be done to understand the role of local and global processes in these different regional realities. We believe that the present volume has highlighted

17 Crawford (1970).

some promising approaches to bring this about and hope that it will contribute to the further development of integrated approaches to study Roman economies.

Acknowledgements

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While finalizing the manuscript of this volume, we received notice that our dear colleague Sara Santoro has passed away after a short but terrible illness. We will remember her for both her outstanding scientific contributions and her kindness. We dedicate this volume to her memory.

PART 1

The Economic, Social and Geographic Context

CHAPTER 1

The Benefits of Market Integration: Five Centuries of Prosperity in Roman Italy

Willem Jongman

1 Rome in World History

Roman history does not sit very comfortably in the modern study of history. Many ancient historians do not work in History departments, but in Classics departments, and the same applies to classical archaeologists. Thus, there is real history, and there is ancient history. There is real archaeology and there is classical archaeology. These distinctions do indeed involve a value judgment, where ancient history and classical archaeology are of the inferior kind. And to be honest, there is, or perhaps rather was, some truth in that. Traditionally, both ancient historians and classical archaeologists have been conceptually and methodologically less sophisticated than modern historians or pre-historical archaeologists. They did not and often still do not engage in the wider debates on world history or the nature of historical writing. They are often still stuck in the self referential universe of classical civilization. But where does that classical civilization fit in larger narratives? Why does it matter that we know about it, rather than about the histories of other peoples in the world? Is there a special reason, and if there is, are we telling the right story?

For centuries, and ever since the Renaissance, ancient civilization, and ancient Rome in particular, was a civilization to admire. And that was not for nothing. Imagine what it was like to live in Renaissance Rome, with some 35,000 people in the ruins of a city that had once housed 1 million. Roman civilization not only gave Europe a religion, but also a sophisticated legal system, examples of architectural style, literature, philosophy, and the art of modern warfare. This is not to deny the unique contribution of mediaeval culture and society, but we must acknowledge the importance of classical examples in the shaping of post-mediaeval European culture and society.

The admiration for antiquity lasted largely unchallenged until the Industrial Revolution, when, for the first time, antiquity's achievements were unequivocally surpassed. They were surpassed technically, economically, or militarily with modern warfare such as in the American civil war and the advent of the machine gun. Within half a century life expectancy in the more advanced

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nations roughly doubled, resulting in major population growth: during the nineteenth century, world population almost doubled. With the rise of modern art, antiquity also lost its cultural appeal. Politically, the rise of socialism and mass democracy mark a similar watershed. In short, antiquity was truly left behind, to become a subject for antiquarians.

It was the achievement of French historians of the *Annales* school and of British historical demographers like Peter Laslett and Tony Wrigley to demonstrate that the preindustrial past is indeed a foreign land, and a world we have lost. The man who most clearly underscored this for classical antiquity was Moses Finley: antiquity was not like the modern world, far from it. The strength of his analysis was always that it was deeply rooted in his interest in and commitment to the modern world; his interest in the rise of the modern world was fed by an uneasy mix of Marxism and Weberian sociology. So, in contrast to modern historians such as Tony Wrigley who emphasize the essential discontinuity represented by the Industrial Revolution, Finley was inspired by Marx, Weber and Sombart to locate the roots of modernity in the earlier rise of the mediaeval commercial bourgeoisie.[1] For them, modernization was a much longer and drawn out process rather than a sudden break with the past.

As a consequence, classical antiquity was relegated to the role of primitive precursor, and its economic history became one of what it was not: it lacked interdependent markets, and trade and manufacturing were of limited importance because they were mostly local and small-scale. The explanation for that was a social and cultural one: overriding cultural norms prevented the elite from participation in trade and manufacturing, leaving these to social outsiders like freed slaves. As a result, trade and manufacturing had to do without elite capital investment. Not only did they, therefore, remain small, but there was also little technical innovation outside the world of the military. Again, Finley's explanation was a cultural one: without an economically rational commercial bourgeoisie there was no interest in innovation. As a result, there was no economic growth. So not only was there no Smithean growth, but there was no technology-led growth either. The elite remained a land owning elite, extracting rents from a landed property that was managed quite traditionally, and without an eye for technical improvements or economic efficiency. These were land owners with a rentier mentality and not a business mentality. On the institutional side this underdevelopment was matched with an underdeveloped financial and monetary system.

1 Finley (1985); cf. Jongman (1988) chapter 1 for discussion.

Finley's analysis was an intellectual tour the force, because it did indeed integrate everything into one coherent picture. It was a picture, moreover, that gave antiquity an identifiable place in pre-industrial world history. The problem with Finley's analysis, however, was that he failed to investigate antiquity's actual comparative economic performance. Once it was established that there was no modern economic growth, no modern international business or accounting, and no modern technology, the questions stopped.[2] Antiquity was underdeveloped and that was it. All that remained was to understand why this should be so, and Finley's answer was: elite norms and values. As a result, a few decades of research were mostly focused on the social analysis of trade and manufacturing as possible explanations for that failure. In so far as agriculture was studied, it was in terms of the behaviour of rent-extracting landowners, and dependent peasants. Given the cultural turn of Finley's analysis, much research on the ancient economy (though not all) also failed to integrate and properly appreciate the new work that was being done in archaeology, even though the volume of that work was still very limited at the time. Finley recognized archaeology's potential importance, and encouraged graduate students to get involved, but he never properly integrated its findings into his own model of the ancient economy. Archaeologists in turn could often not make much of these historical models they could not recognize on the ground, and were smitten by the New Archaeology's insistence that archaeology is archaeology is archaeology, and should avoid contamination with history. Subsequent post-processual insistence on the importance of the unique and the particular did not help either.

What we thus all failed to do was to investigate empirically how well or how badly the ancient economy actually performed, before we discussed the cultural explanation for such a possible failure. Of course, the ancient economy was not as successful as modern economies with their long term annual growth rates of 2% or more.[3] But that does not exclude the real possibility that there were major and interesting differences between economies before the Industrial Revolution. Did these economies all perform roughly the same, or were some far more successful than others?[4]

2 Jongman (2014).

3 Allen et al. (2005).

4 Cf. Feinman (this volume).

2 Human Numbers

So let us leave these discussions behind, and let us take a clean sheet of paper. What would we like to know about this recently discovered civilization on planet earth, and how can we find out? The first metric that any economist would like to know is population size. If there is one big story of the last 10–12,000 years it is that of population growth. This population growth has obviously been most spectacular over the last two centuries or so, but the preceding 12,000 years have also shown a big rise. There were only very few humans at the end of the last Ice Age, but after that our number has started to grow. Precise numbers are impossible to give, but over the last twelve thousand years world population has grown from a few million people in 10,000 BC, to 5–20 million in 5000 BC, after which the Bronze Age and Iron Age witnessed a rapidly increasing growth to the classical period, with some 200–300 million at the beginning of the classical era, a level that only began to be exceeded in the High Middle Ages, to reach some 600–700 million in 1700, 1600 million in 1900, and over 7 billion today.[5] On a global scale, therefore, the period of 500 BC to about AD 500 represents an elevated plateau, and it pays to look more carefully into Rome's place in that story.

The first way to do that is to evaluate Rome's share in the world population of its time. For the period around the beginning of the modern era, the traditional estimate for the empire's population is about 55 million, giving Rome roughly a quarter of the world's population. Recently, however, scholars have begun to suggest that the Empire's population may well have been rather larger, up to perhaps about 100 million people.[6] Whatever the precise merits of these estimates, Rome must have been the most populous state of its time (China was probably a rather close second).[7] Ancient Rome does indeed merit a prominent place in world history. That demographic weight is also strikingly visible in a recent and spectacularly detailed survey in the brown coal area of the Rhineland, as reconstructed by Andreas Zimmermann and this team (Fig. 1.1).[8]

The chronological resolution of this graph of long term trends is inevitably low, but it is enough to show that in Roman times an almost empty landscape in this region quite suddenly filled up with farms, villas and villages in

5 Wikipedia sv world population estimates: https://en.wikipedia.org/wiki/World_population_estimates (accessed 26 July 2015).

6 Lo Cascio (2001); Scheidel (2007a).

7 Ebrey (1999, 50). Interestingly, this implies that between them these two large empires included perhaps half the world's population.

8 Zimmermann et al. (2009).

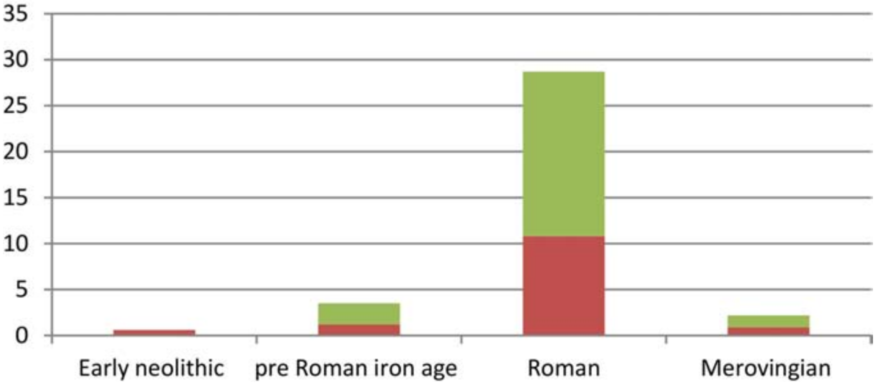

FIGURE 1.1 *Population trends in the Rhineland (data after Zimmermann et al. (2009)). Bottom part of bars: minimum estimate. Bottom plus top part: maximum estimate.*

a remarkably dense pattern. The subsequent decline is perhaps even more dramatic. The Merovingian world was once again one of empty landscapes. Of course this is only one example, but it is important for two reasons. The first is that of the long chronological perspective. This graph pictures Roman society's place in the long run, and it shows immediately why Roman history matters. The second reason is that these are actually provincial data, underscoring that Roman achievement was not restricted to an imperial core that benefited from imperial expansion. Rome's success was not limited to squeezing conquered provinces. In the process, provinces obviously benefited. Moreover, the same population growth that we see in the very long term demographic history of the Rhineland is also visible in the greater chronological detail of Italian field surveys, as argued by Alessandro Launaro, and here exemplified in two graphs of data from the Groningen Nettuno survey and from Lisa Fentress' work in the Albegna valley (Fig. 1.2).[9]

The point I want to make with this graph is on the one hand the magnitude of this demographic growth and subsequent decline, and on the other hand the similarity of the trajectories. Archaeologists sometimes like to emphasize that their valley is different, but insofar as that is so, this is only in relation to a larger trend that pervaded most if not all of Italy, and perhaps even the Empire.

This rural demographic growth from the late 4th and early 3rd century BC is all the more important because it went hand in hand with a spectacular urban growth in Italy from about the same time (that was followed by a similarly dramatic late antique decline). For the early imperial period 431 towns have

9 Launaro (2011a); De Haas et al. (2011); Fentress (2009); Potter (1979).

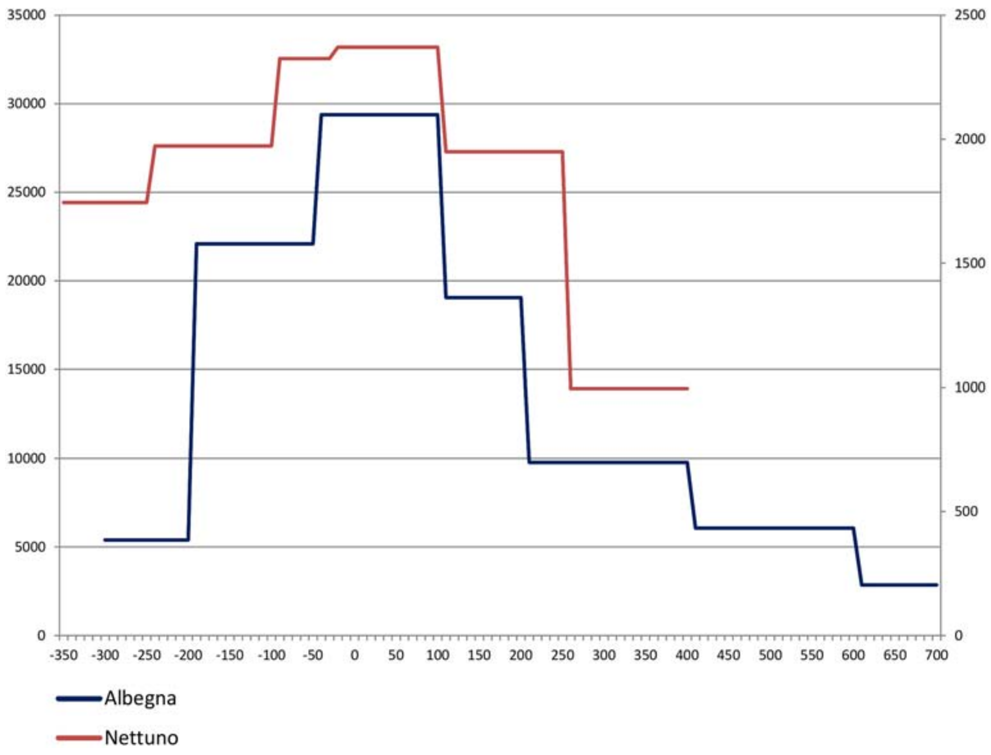

FIGURE 1.2 *Population trends based on data from field surveys around Nettuno and Albegna (data after De Haas et al.* (2011) *and Fentress* (2009))

been identified in Italy.[10] Of them, the city of Rome with its perhaps about one million inhabitants obviously stands out. No other city in history had been this big, and no other pre-industrial city would be this big for a long time to come. In Europe, the next city to have one million inhabitants again would be London around 1800, i.e. well into the early stages of the Industrial Revolution. Rome, moreover, was not the only Italian city. From the late 4th or early 3rd century BC the number and size of other cities had also increased substantially and perhaps more than is often assumed. In the traditional low count of the population of Roman Italy its population numbered about 6 million in the Augustan age, with the city of Rome at just under 1 million inhabitants and a similar number for the other 431 cities together. This has a puzzling implication. On the one hand it means that the Italian urbanization rate was some 30 %, and that is very high by pre-industrial standards. On the other hand it means that

10 Jongman (2001); Hopkins (1978a); Jongman (2007a).

the average population of these other Italian cities was implausibly small at just over 2000 inhabitants each. Since we know that there were a number of rather bigger cities apart from Rome, the remainder would need to have been even smaller. That just does not make sense. So we either have to accept an even higher urbanization rate, or a rather larger total population. Of the two, I think the latter is the far more plausible, and all the more so in view of the upward population trends that we are now beginning to discern in rural field surveys.

The trends in the number and size of Italian cities reflect the emergence of Italy as one of the most urbanized societies in pre-industrial history. This is important for two reasons. The first is that demographically this could only have been achieved by massive immigration from the countryside, to make these cities grow in size and number, but also to make up for the high urban mortality that characterized all pre-industrial cities and big pre-industrial cities in particular.[11] The second is that such high levels of urbanization imply a successful and productive agriculture. Urban populations depended for their food on the countryside. However, they also depended on rural purchasing power above subsistence to buy the products of urban manufacturing (and some services), either directly from rural inhabitants, or more indirectly, from landowners residing in the cities. Thus, urbanization both reflected growth, and contributed to it.[12]

The late Republic and early Empire were periods of demographic expansion and urbanization, even if we do not yet know why this started, or why it ended. The subsequent question is of course: what did this mean for people's lives? Did people have more babies, and did they—perhaps—survive better because conditions had improved? And/or were they subsequently constrained by Malthusian positive checks such as a declining popular standard of living and even hunger and disease? Were they pulled by the allure of urban life, or were they pushed by rural misery?

3 Prosperity

The economic analysis of the problem is the simple one of changes along the production function. What happens when fixed quantities of one production factor, such as land, are combined with more and more of another, such as labour? Because that is what population pressure does: it changes the land—

11 Jongman (2003).

12 Malanima (2009).

labour ratio. A production function describes the output from varying quantities of factors of production such as land, labour and capital, utilizing existing technology. Using more labour means a movement along this production function, and almost always this involves declining marginal returns to labour. Thus, using twice as much labour raises output, but less than double. This then is the neo-classical reworking of the classic Malthusian nightmare. Population growth erodes labour productivity, and thus the standard of living of the working mass of the population. It also benefits landowners, because the productivity of land increases, and therefore rents go up. Population pressure thus increases the social distance between rich and poor. So did Roman population pressure cause a *Verelendung* of the lives of ordinary Romans? Historiographically, this exposes a fascinating paradox because precisely those ancient historians like Brunt and Hopkins who argued for demographic stagnation, also foregrounded social tensions and rural poverty.[13] In my view population did in fact grow, so the question is how the economy coped, and with what results. Was there a way out of the Malthusian trap and was there an escape from declining marginal labour productivity? Can we measure Roman popular prosperity? And can we measure changes in that prosperity?

My first argument would be to invoke the collective knowledge of field archaeologists. I think all will agree that just about any excavation will show Roman levels with a far richer material culture than from periods before or after. What indeed struck me in many of the chapters in this volume is that the later Republican expansion and subsequent later antique contraction return in many examples.[14] They return in explicit graphs of the chronological distribution of finds, but also more implicitly in the life histories of excavated sites. What would be really nice to have for this is better time series of aggregate data on material culture rather than individual case studies. Absolute measurement of material standard of living is hard to calibrate, but changes over time can be as revealing.[15]

Apart from material culture as an indicator of standard of living we may look at diet. Subsistence has been studied quite extensively, but real prosperity assumes a diet that is better than just enough calories.[16] A few years ago I published a graph of Roman animal bone assemblages, based on Tony King's dataset, and interpreted by me as a proxy for meat consumption (Fig. 1.3).[17]

13 Brunt (1971a); Hopkins (1978a).
14 E.g. Pasquinucci and Menchelli (this volume) and Bowes et al. (this volume).
15 See Tol (this volume) for an example.
16 Garnsey (1989).
17 Jongman (2007a); King (1999).

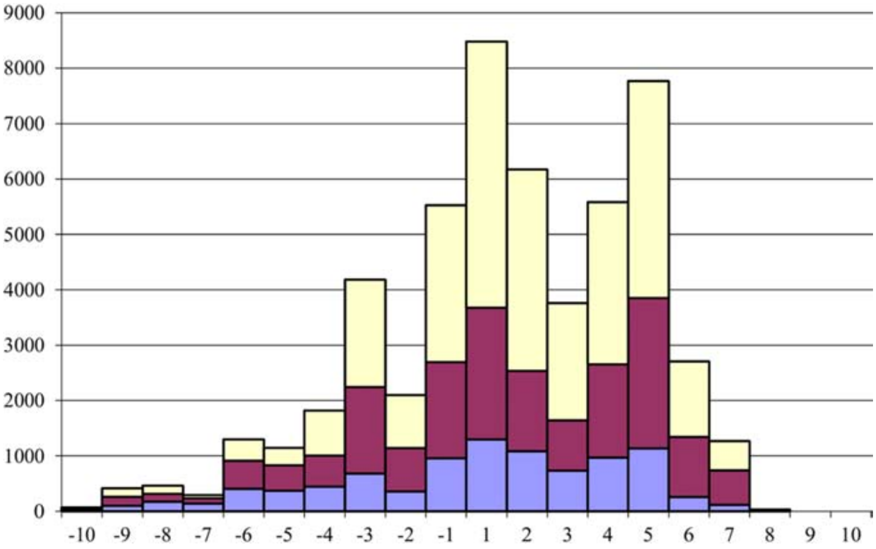

FIGURE 1.3 *Animal bone assemblages from Roman Italy (bones divided from top to bottom into pig, sheep/goat and cattle, deposited per century; data after King (1999))*

I should add that late Republican and early Imperial animals were not only more numerous, but also larger.[18] Add to this Geoffrey Kron's account of game, the rise in the number of fruit and nut trees in Pompeii as elucidated by Robyn Veal, or Erica Rowan's analysis of the remains of rich diets as shown in the Herculaneum sewer, and we have a story of much improved diets.[19] Such diets did not come cheap. Meat, and game in particular, therefore was a high income elasticity good, i.e. it is what people switch to when their incomes have grown. The same can be said for food such as wine and olive oil. These too were expensive calories.[20]

However, how does all this relate to population trends? Was there not simply more production and consumption because there were more people? What we really want to know is per capita production and consumption. Did these grow as well, or did they decline under population pressure? To investigate this we can look in more detail at the data from the Groningen Nettuno survey (Fig. 1.4).[21]

18 Jongman (2007a).
19 Kron (this volume); Veal (this volume); Rowan (2017).
20 Jongman (2014); Jongman (2016).
21 De Haaas et al. (2011); Jongman (2014).

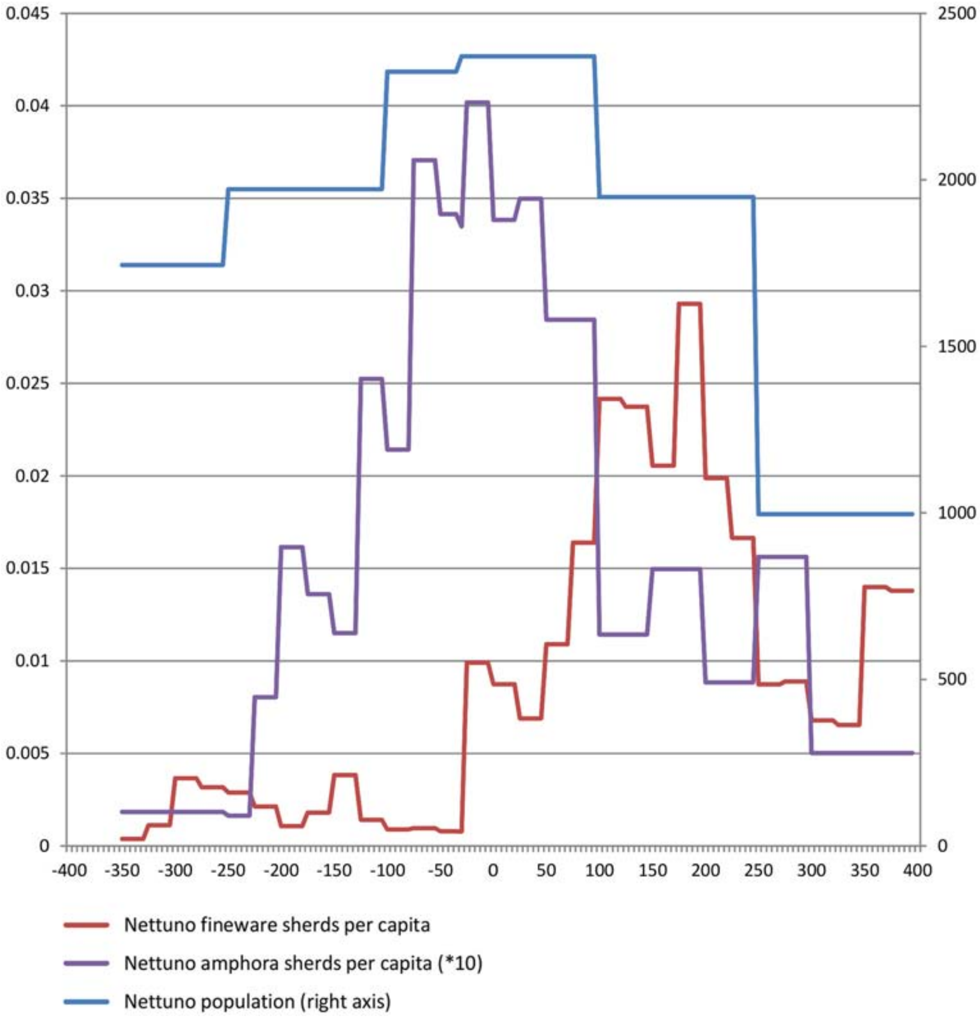

FIGURE 1.4 *Amphora and fine ware consumption per capita in the Nettuno area* (*data after De Haas et al.* (*2011*))

What I have done here is to divide the two time series of amphora and fine ware sherds by the trend in population in that very same area. The result is two graphs that represent the trends in *per capita* consumption/production of amphorae and fine ware. The obvious conclusion is that precisely in the period of greatest population pressure, *per capita* production/consumption of these two goods increased as well, to decline again in tandem with population. I admit that this is only one example, but the method can be used on other data sets as well. Can we replicate this pattern? For now, my hypothesis is that for a

while people were more prosperous than before, or after. And if I may venture a guess, I think they may well have been as prosperous as the most prosperous people in Europe on the eve of the Industrial Revolution, i.e. the Dutch and English.

4 Agricultural Change

The question is, therefore, how was this possible? And more particularly, how was this possible in agriculture? I mention agriculture because it was still by far the largest sector of the economy, and if the story needs productivity gains, we do best to look here. Agriculture had to feed the burgeoning cities, and agriculture had to generate enough rural demand for urban high income elasticity goods and services.

Analytically there are two possibilities. The first is that of the static and dynamic gains of specialization and division of labour. This is what is behind the idea of increasing returns to scale that figure so prominently in Paul Krugman's new economic geography.[22]

The conference has produced ample evidence for this connection to the wider market through specialization and division of labour, be it in the form of the production of crops such as wine, of pasture or of the production of game.[23] Often the competitive advantages would be for location and proximity to markets, rather than anything else.[24] The stories of rural ceramic production are probably more complex, with their mixture of the availability of clay types, of technical expertise, and changing transport costs. Even so, here again we witness a rural economy that is intimately connected to the wider world, and produces for that market. It shows that minor centres could play a major role.[25]

Yet this is also the moment to insert some caution. Many of these developments occur roughly simultaneously, and it is hard to disentangle their interconnection. In part this is because the chronologies are still imprecise, but it is also because it was probably not a simple chain of cause and effect, but a complex process of positive feedbacks.

The second possibility is the potential for technical improvements to agricultural practice. Technology after all is not the same as just machines. We have

22 See Brakman et al. (2009) for an introduction.

23 See Olcese (this volume), van Limbergen et al. (this volume), Bowes et al. (this volume) and Kron (this volume).

24 See De Haas (this volume) and Peña (this volume).

25 See the contributions by Santoro and Vaccaro et al. (this volume).

seen the evidence for intensification and the argument for convertible agriculture advanced by Geoffrey Kron (this volume) and by the Roman Peasant Project (Bowes et al. this volume). In this context, Frits Heinrich's (this volume) argument that crop choice is a technological decision is highly relevant. He used the argument to show that certain varieties of cereals are more suitable for transportation than others, or may guarantee a more stable production. Daphne Lentjes' recent work similarly shows the impact of market access on crop choice.[26] Moreover such arguments can also be used for a choice between the cereals that dominated earlier reconstructions, and other crops that figure in reconstructions such as those by Paul Halstead, already a long time ago, and now proposed by for example Geoffrey Kron or Kim Bowes who argue for a more prominent role for pasture and convertible agriculture.[27] Perhaps this is the moment to return to the issue of marginal revenue productivity, because the attraction of such crops is that they can probably produce much more revenue per hectare. This means that the extra labour does not suffer so much from declining marginal labour productivity in cereal agriculture, but is used productively.[28] I am not sure we can ever reconstruct this for game, but we can for wine, and to some extent for olive oil.[29] And these of course are precisely the crops that figure so prominently in reconstructions of Republican agricultural change. The first thing to realize is that both wine and oil can produce about five times more calories per hectare than cereals. So even a small move to these liquid crops dramatically increases carrying capacity, thus removing in a stroke the best argument against low count reconstructions of Italian demography. If only Romans would drink enough, there could easily be many of them. The calories in wine and oil, moreover, were expensive calories. For wine they were typically about five times more expensive than cereals, and for oil perhaps two times. So a switch to viticulture could raise revenue perhaps 20 or 25 times. Admittedly, oil and wine were also far more labour intensive to produce, but even with all the uncertainty about labour requirements and prices of foodstuffs, I think it is fair to say that revenue could be increased dramatically, and also that such a switch was precisely what was necessary to avert the nightmare of declining marginal labour productivity. It made good use of all that labour.

The examples I have given were for oil and wine, because they were important in the diet, and because we have enough vaguely reliable data to model

26 Lentjes (2013).
27 Halstead (2014).
28 Jongman (2016).
29 Jongman (2016).

the argument. I am sure, however, that this same logic applies to fruits and vegetables, or to game. I think it probably also applies to rural industries such as pottery production. They too provided profitable employment to rural labour. To the extent that these were also seasonal activities, that increased the productivity of a labour force that suffered from severe seasonal unemployment in agriculture.

5 Market Integration

To conclude the story we need to realize two implications. The first is that these were not subsistence activities. These goods were produced for the market, and often the urban market. That presupposes a network of market integration, of transportation and of information, and occasionally of rural manufacturing. Without the connections provided by minor centres that would have been harder.[30]

The second implication is that the story presupposes the existence or emergence of a large enough group of consumers who were prosperous enough to afford more expensive food, or fine tableware. The benefits of specialization and high labour productivity were only available to a society that was prosperous enough to benefit in the first place. It was a high level equilibrium, and thus a vulnerable one. And that brings me to my final point. Many chapters in this volume discussed the rise of this complex system, but its collapse is equally worthy of attention. The collapse of the system shows the foundations it was built on. The decline of the cities and long distance trade eroded the market for high added value rural production, and so did the decline in standard of living in town and country.

30 See De Haas (this volume) and Santoro (this volume).

CHAPTER 2

The Global Roman Countryside: Connectivity and Community

Robert Witcher

1 Introduction

How were the rural populations of Italy integrated into the changing economic structures of the Roman period? To what extent did cities and urban populations drive change? When, where, and by whom was investment made in infrastructure? What was the impact of economic development on rural communities? Such questions about the Roman past have also been asked about other historical periods. For example, evaluating the impact of expanding capitalist economies on the integration of the agrarian empires and peasant populations of the 18th century AD, historians have come to contrasting conclusions.[1] One group has drawn attention to the evolution of a 'dual economy', whereby urban populations pulled away socially and economically from rural populations, leaving the latter isolated and stubbornly poor. Conversely, exponents of World Systems Theory have argued that it was precisely the integration of these rural communities into the industrializing economy that created their economic dependency and underdevelopment. The significance of this example is that, in trying to answer very similar questions about rural integration, historians of more recent periods with access to more and better quality data, have failed to find agreement. From the outset, this is a useful reminder of the scale of the challenge involved in the study of Roman rural integration.

Fast forward 250 years to the present. Scholars studying the industrial and heavily urbanized contemporary world have focused relatively little attention on rural economies and their integration, concentrating instead on concepts such as the 'global city'. Indeed, globalization and rural studies have been seen as more or less mutually exclusive: cities are the drivers and loci of globalization, while rural landscapes are the collateral damage: de-peasantization, emigration, and environmental destruction. The policies which promote globalization and the integration of rural communities are particularly contentious. Is

1 See Bayly (2004, 410).

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more globalization part of the solution: bringing investment, improved infrastructure, better health and education, and new market opportunities? Or is more globalization the problem: undercutting peasant farmers, creating market dependency, stimulating rural-urban migration, and degrading the environment?

Recognition of this urban bias in globalization studies has led a number of scholars to develop a stronger rural perspective. The present chapter draws on studies which have sought to 'ruralize' the study of contemporary globalization and explores these ideas in relation to the Roman past. The suggestion that studies of the modern world—and, especially, of globalization—may be of value for understanding pre-modern times is controversial; but it should be noted that a number of existing studies of Roman and other pre-industrial societies have already incorporated some of the vocabulary—and even concepts—of globalization. At the very least, then, explicit exploration of these ideas in relation to Roman rural integration may help to expose underlying assumptions; it may also identify connections between aspects of existing research, help reformulate questions, or open new avenues for investigation.

To this end, the first half of this chapter explores the notion of the 'global countryside' as a possible approach to the rural integration in Roman Italy. The second half takes two specific social and economic themes—connectivity and community—through which to explore in greater detail how the archaeological evidence for rural integration might be reinterpreted.

2 The Character of the 'Global Countryside'

The notion of 'Roman globalization' has been around for at least a decade and a half,[2] and continues to gain popularity.[3] Some scholars have drawn loosely on the language of globalization (including as a synonym for Romanization); others have gone further and sought explicitly to apply the underlying theoretical concepts. Debate on this issue cannot be reviewed here, suffice to say that globalization should not be taken as an attribute unique to the contemporary world, but rather as a series of trends—such as time-space compression and relativizing perceptions of self and others—which can be traced back into the past and which varied in scale and intensity.[4] There are two key advantages of

2 E.g. Witcher (2000).

3 E.g. Hitchner (2008); Pitts and Versluys (2015).

4 See papers in Hodos (2017).

a globalization approach to the Roman past. First, it emphasises diversity. In contrast to Romanization, which is based on an opposition of Roman vs. Other and allows for cultural change in only one direction, globalization presumes neither a core dichotomy nor a pre-determined outcome. Second, globalization requires a long-term and broad-scale perspective; this demands that the Roman period is understood comparatively in relation to earlier, contemporary and later societies and not as a unique historical phase.

It is crucial, however, to recognise that the characteristics associated with globalization (e.g. time-space compression) are primarily descriptive. The challenge is to explain what causes these characteristics and their variation over time. Such explanation is also where the differences between ancient and modern globalization lie. Morley expresses this succinctly: "The great difference between ancient and modern ... lies in the driving forces of the two processes of globalization—political unification on the one hand and economic interdependence on the other—and in the very different degrees to which the world was 'compressed'".[5] Crucially, he goes on to observe that the Roman world was not greatly 'compressed' by improved communications,[6] and that "this clearly limited the possibility of economic integration".[7] Although Morley states that "Classical antiquity was a world of networks and connections",[8] he is resolute that this movement of people, goods and information was not essential for life: "There was no ancient equivalent of a commodity such as oil, supplied from a limited number of locations but entirely indispensable for the workings of the world economy, and the interdependence—and vulnerability—of the system was correspondingly limited". As a result, the Roman world was not at its most 'globalized' economically but rather symbolically.[9] Nonetheless, as discussed below, the political and social interdependence of the Roman world still had significant economic effects.

Turning specifically to the effects of contemporary globalization on rural landscapes, recent years have witnessed a renaissance in 'rural studies'. Periodicals such as the *Journal of Peasant Studies* have reinvented themselves (and the sub-discipline) as pertinent and political. Concerns about food security (e.g. genetic modification and land grabs) have put rural studies back on the mainstream agenda. Not least, although over 50 per cent of the world's population

5 Morley (2007a, 95).
6 Cf. Hitchner (2012).
7 Morley (2007a, 95).
8 Morley (2007a, 96).
9 Witcher (2000).

now lives in towns and cities, small farmers (producing primarily with family labour for their own subsistence needs) remain a substantial demographic group across Central and South America, sub-Saharan Africa, and Asia. There is intense debate about the social, political, and economic effects of integrating these rural communities into the contemporary global economy.

One scholar who has pulled together these diverse strands is the rural geographer Michael Woods. Through a series of influential articles, he has advanced the provocative notion of the 'global countryside'.[10] His aim is to counteract the emphasis of globalization scholarship on urbanism and the 'global city' and to develop a heuristic device through which to explore how rural landscapes develop in the context of globalization. In trying to rebalance urban and rural, he shares motivation with many recent archaeological studies, for example, in the Near East[11] and Mesoamerica,[12] as well as the Roman world.[13] Discussing Roman Britain, for example, Taylor argues that archaeologists continue to perpetuate an urbanocentric approach by focusing on 'familiar landscapes' which conform to prior beliefs about the expected form and effects of rural integration; consequently, 'unfamiliar landscapes', which may well have been much more common, are neglected.[14] As an example, archaeologists have focused on the introduction to Roman Britain of new, rectangular architectural forms rather than the continuing tradition of round houses.

The 'global countryside' is an attractive model for thinking about the character of the rural landscapes of Roman Italy, and the empire more generally. It must be stressed that exploring the Roman countryside in this way does not mean that its defining characteristics were identical to those of the contemporary world, in either form or degree; nor could any similarities be explained in the same ways. Indeed, it should be noted that the model concerns a hypothetical 'global countryside' which Woods suggests does not exist even today. Rather, the model is to be used as Woods himself intended it—as a device through which to think about the integration of rural communities in order to formulate other possible questions and explanations.

The 'global countryside' is defined by ten characteristics, collectively pointing to a further overarching trait: hybridity.[15] Woven through this definition of the 'global countryside' are themes already familiar from the study of Roman

10 Woods (2007; 2009).
11 E.g. Hritz (2013).
12 E.g. Robin (2013).
13 E.g. McCarthy (2013).
14 Taylor (2013).
15 Woods (2007, 492–494).

rural landscapes: community, connectivity, commodities and crisis. Below, each characteristic is listed (with slight modification to Woods' terminology and order) and accompanied by brief comments and examples drawn from both the modern and ancient worlds.

1. *Elongation of commodity chains and increased dependency on the consumption of imported commodities*. This leads to vulnerability to global economic, political and cultural change—or 'shocks' (e.g. in fashion and finance)—which may be triggered by decisions or events far away from the localities affected.
   The exchange of commodities was not fundamentally new in the Roman period. Indeed, Horden and Purcell's ecological model demands connectivity and exchange as the basis for survival in the risky Mediterranean environment.[16] The globalized countryside can, however, reach a tipping point: from connectivity that improves resilience to connectivity that increases vulnerability. Issues of dependency—and the opportunities and vulnerabilities it creates—are most obviously recognized in late republican and early imperial landscapes such as the *ager Cosanus* and Northern Campania where specialist production for export permitted rapid growth, followed by retrenchment—or 'boom and bust'.[17] Across a longer chronological scale, the rise and fall of settlement, population and economic activity in the *suburbium* of Rome represents a similar process by which rural communities became linked into longer and more complex chains of dependency that were ultimately vulnerable to distant events.[18]
2. *Externalization of property ownership and investment*. As property comes to be owned by non-local individuals, families and organizations, wealth is drained out of a region. In recent years, for example, some governments have bought tracts of land located in different nation states in order to secure agricultural or mineral supplies; such 'territorial grabs' have become contentious. There is resonance here with the Roman past, whether the state securing Egypt as a source of grain for the *annona* or the acquisition of land (though confiscation or purchase) for colonial settlement schemes. The effects of 'absentee landlords' on investment and wealth extraction is a perennial theme for studies of post-Hannibalic southern Italy, for example.[19]

16 Horden and Purcell (2000).
17 Arthur (1991); Carandini et al. (2002).
18 Patterson et al. (2004).
19 Fentress (2005, 487).

3. *Social power and economy are monopolized by fewer people and institutions.* In the contemporary world, governments, financial institutions, and multinational corporations secure growing control over societies and economies. In the Roman past, such monopolization may have been pursued by local individuals and families who found new opportunities through integration into wider social networks or, as discussed above, by external agents such as colonists and administrators. There are connections with, for example, the traditional narrative of the replacement of peasant farms by slave estates[20] and the growing personalization of power in hands of the emperor.
4. *The scaling up of social and political authority beyond local reach.* In the contemporary world, this might involve international treaties or banks making decisions which affect individuals and communities around the globe but which leaves them with less agency to act. In relation to the Roman world, there is debate about the degree to which peasants were connected to wider political structures and therefore the degree to which they were affected by the scaling up of authority. For example, some scholars envisage peasants to have been largely unaffected by an 'epiphenomenal' empire,[21] while others envisage a more cognisant and savvy peasantry plugged into wider economic and political networks;[22] the former would have been increasingly distant from authority whereas the latter must have worked against the odds to enhance their agency.
5. *Enhanced social polarization whereby the enterprising few have new opportunities to amass wealth but the majority do not.* Growing social inequality is high on the contemporary global agenda. In the Roman world, it is possible to see growing difference between the haves and have-nots. But there is evidence, for example from Pompeii and the *suburbium* of Rome, for increased differentiation in the 'middle' too.[23] Either way, wealth in the Roman world was a potent instrument of social differentiation and much of that wealth was based on the control of land.
6. *The global countryside is a supplier—and user—of migrant labour.* The connectivities and dependencies of globalization both displace people and open up destinations for them. These migrations operate on multiple scales: from countryside to town, and from region to region. Such mobility has been well explored in relation to Roman Italy, whether as a result of

20 Hopkins (1978a).

21 E.g. Terrenato (2007).

22 E.g. Kron (2008a); generally, Witcher (2016).

23 Witcher (2008).

colonization and veteran settlement[24] or in terms of the factors pushing and pulling people to Rome (e.g. the grain dole, employment, or dispossession).[25]

7. *The global countryside is inscribed with the marks of globalization in the form of environmental degradation including deforestation, erosion and the expansion of pastoral landscapes*. In the contemporary world, dramatic shifts from small-scale polycultures to intensive monocultures (often producing more food on less land) lead to shifting ecologies. Valleys and coasts are often exploited intensively, while uplands are abandoned. There are echoes with the Roman past in terms of the replacement of peasant agriculture with more specialist and intensive production of oil and wine. There were also environmental impacts linked, at least partially, with the intensification of agricultural production, including erosion and flooding, the growth of deltas and silting of harbours, and changing types and distributions of vegetation.[26]
8. *The global countryside involves a discursive construction of Nature*. The commodification and exploitation of rural landscapes is associated with a notion of Nature as distinct from—and subject to—Culture. Both Purcell and Traina make similar assertions about Roman (elite) attitudes to Culture/Nature,[27] as do art historical studies, such as interpretations of the garden frescoes from the Villa of Livia.[28]
9. *The global countryside is used less for agricultural production and increasingly as the focus of leisure and tourism*. In the contemporary world, 'inefficient' agricultural economies may be reoriented around tourism, wealthy urban-dwellers buy weekend rural retreats, and rural heritage is commodified so that urban populations may commute to 'traditional' festivals in order to connect with their extended (rural) families and the pre-urban past. Similarly, parts of the countryside around Rome were characterized by *otium* villas representing the consumption of wealth and elite leisure. Urban populations more generally might travel out of the City of Rome to visit the sanctuary of Anna Perenna or to witness the archaic rituals revived under Augustus.[29]

24 Scheidel (2004).
25 Erdkamp (2005); Patterson (2006).
26 Walsh (2014).
27 Purcell (1990); Traina (1990).
28 Leach (1988).
29 Torelli (1991); Witcher (2013).

10. *The 'global countryside' is contested.* Usually, disputes over globalization focus on immediate economic or social triggers, such as those listed above, but they draw on deeper issues of cultural identity. This is perhaps an area where there is the potential to bring together work on economic integration in the Roman world with that on Roman cultural integration.[30]

Woods suggests that no landscape exhibits all of these characteristics, or to the same degree, because each rural locality is defined in dialogue between local and global.[31] The overriding feature of the 'global countryside' is its hybrid character; the diverse—even contradictory—effects of integration are entirely normal. The processes of social, political and economic integration do not lead to a homogenous world; rather the local redefines itself through reference to the global and bequeaths a legacy to it. Existing differences can be crystallized and exaggerated,[32] but the 'global countryside' is not simply the persistence of local diversity alongside pockets of development, but rather a transformation: local distinctiveness exists in the 'global countryside' but it is different from what went before.[33]

The integration of rural communities into the globalising economy of the Roman world is marked by diversity. Field survey demonstrates the regionalism of Roman Italy in terms of the numbers, densities, and types of sites and—just as importantly—indicates the diversity of the underlying processes which generated these differences. In urban centres, the early imperial resurgence—if not, outright invention—of local identities mirrors this situation, as communities adopted global markers such as epigraphy and monumental public buildings and used them to (re)assert their distinctiveness.[34] In the contemporary world, globalization of the local is reflected by the global recognition of local distinctiveness—for example, it is only meaningful to associate generic products with certain regions or places if they have been globalized within a wider market of products and symbols, hence French wine, German beer, and Spanish ham. The association of various agricultural products with distinct provenances in Roman Italy reflects this trend; for example, apples from Signia and nuts from Praeneste.[35]

30 E.g. Van Dommelen and Terrenato (2007); Bowman and Wilson (2009b).
31 Woods (2007, 494–495).
32 Woods (2007, 489).
33 Woods (2007, 500).
34 E.g. in the Tiber valley (Keay (2010)).
35 Morley (1996, 107 and map 2).

Superficially, the globalized world appears homogenous and the role of the state dominant. But this is a "trick of the light".[36] In reality, states targeted intervention strategically and in circumscribed situations; their power was patchy and largely delegated. The diversity of the 'global countryside'—Roman, early modern or contemporary—is not the result of the success or failure of top-down economic integration, but rather an expression of varied local dialogues. This is the micropolitics of negotiation and hybridity,[37] though it must always be recognized that 'negotiation' might take the form of violence and is usually conducted between groups of asymmetrical power.

The concept of dialogue also helps to address the problem of whether it is better for us to study the past top-down or bottom-up. The former may result in highly generalized models that are insensitive to local diversity, while the latter may obscure commonalities and understanding of structural connections. The 'global countryside'—the product of dialogue—works both top-down and bottom-up. It provides a general framework within which to locate multiple and varied case studies, relating similarities and differences to unique combinations of local and global interactions.

Further, once the notion of a uniform, pre-determined model of rural integration is replaced by the idea of ongoing dialogue between local and global, it is possible to identify some of the deeper issues that need to be addressed. For example, we need not only to measure and quantify integration, but also to think more profoundly about how we conceptualise it. Cultural and economic integration has often been associated with externally driven change; persistence and continuity therefore become indicative of the absence or even the failure of integration. Not only does this sort of change/continuity dichotomy oversimplify reality, it also affects explanatory frameworks. Change and integration are naturalized as inevitable 'progress', while stasis—the absence of change—requires no explanation at all. Either way, we learn little about how rural populations experienced cultural and economic integration. Even if, more recently, archaeologists have come to see long-term social and cultural stability as historically unusual, and therefore in need of special explanation,[38] this approach still maintains the change/continuity dichotomy and does little to help quantify and explain—not least, if change is 'normal', how is it possible to define baselines against which to measure change and how can specific drivers be identified?

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36 Bayly (2004, 31).

37 Woods (2007, 502).

38 Shanks and Tilley (1987), elaborated in a Mediterranean context by Horden and Purcell (2000).

Globalization stresses continuity and change as two sides of the same coin. Globalization's local distinctiveness is not a geographical patchwork of successful integration (change) and unsuccessful integration (continuity). It is a product of negotiation or dialogue which accommodates both. In turn, this facilitates work on a variety of inter-related explanations. Does the stability of local communities indicate stubborn traditionalism or, conversely, the success of local elites in maintaining their pre-existing social and economic status while negotiating new external pressures? Does the absence of imported pottery—or the use of local imitations—indicate imperfect market integration or successful local innovation? Such questions illustrate the problems of understanding how to measure and interpret rural integration.

In sum, the 'global countryside' concept encourages consideration of different ways to approach the study of the integration of rural communities into the Roman economy. Reviewing these characteristics reveals several aspects on which archaeologists and ancient historians are already working, though they may not necessarily have identified connections, for example, between integration into the global economy and the role of rural identities. Most importantly, the 'global countryside' provides a framework around which to locate and juxtapose the multiple models needed to accommodate the diversity documented by archaeological studies of Roman rural landscapes.

3 Connectivity

With this general framework in place, the second half of this chapter examines two themes—connectivity and community—which serve to illuminate some of the hypothetical characteristics of the 'global countryside' outlined above. Connectivity, through discussion of roads, colonies and ports links with the elongation of commodity chains and increased dependency on imported goods (1), externalization of property ownership (2), and the supply and use of migrant labour (6). The theme of community links with the monopolization of social power and economy by fewer people and institutions (3), the scaling up of social and political authority (4), and enhanced social polarization (5).

Roads

In a recent article, Hitchner discusses the role of Roman roads in regional integration and economic development;[39] like Laurence,[40] he explicitly sets dis-

39 Hitchner (2012).

40 Laurence (2013).

cussion of the integrative power of roads in the context of globalization.[41] He asks: can it be demonstrated that road infrastructure substantially increased the volume and velocity of goods and information in circulation? He raises three issues which make it difficult to connect infrastructure and economic performance in the contemporary world and hence equally if not more challenging to evaluate in the Roman past:

1. Accurately measuring goods and services;
2. Finding quantitative measures of qualitative costs and benefits;
3. And, most importantly, establishing whether investment in infrastructure drives growth or vice versa.

Faced with these problems, Hitchner settles for the likely existence of a positive relationship between roads and economic integration and growth—in other words a correlation rather than causation. As an example, he notes the territory of Roman Cillium, over 200 km inland from the Tunisian coast. Here, during the 2nd and 3rd centuries AD, a dense network of farms collectively equipped with hundreds of oil presses was able to produce enormous surplus for export. The oil was transported to the coast via an extensive and well-made road system. But what came first: investment in the farms and presses or investment in the road network? Did roads drive growth or reflect it?[42]

The evidence from Italy raises similar questions. During the 3rd and 2nd centuries BC, a number of long-distance consular roads were driven through South Etruria (e.g. Viae Flaminia, Cassia, Amerina). These were integral to the establishment of military and political control over the Italian peninsula but it is difficult to associate these roads with any significant local economic growth within four or five generations of their construction if measured, for example, by increasing rural settlement density. Across South Etruria, it was not until the 1st century BC that settlement numbers sharply increased and rural sites began to consume imported goods in large quantities. It was also around this time that the consular roads were paved with durable basalt surfaces.[43] This state investment in paving may have facilitated faster and more reliable transport to Rome, as well as providing economic stimulus through the massive scale of basalt extraction, transport and construction needed.[44] But these paved consular roads alone were insufficient to integrate the vast tracts of territory that

41 See also De Haas (this volume).
42 For a similar situation at Roman Thugga see De Vos (2013).
43 Laurence (1999).
44 Black et al. (2008).

lay in between them; rather, it was the transformation of these long-distance routes into a local network through the addition of (paved) interconnecting roads, or *diverticula*, which gave this state infrastructure local economic value.

It is still, however, difficult to be sure of the sequence of events. Were ridges and valleys gradually colonized by farm estates, with local roads subsequently built to integrate them into the network and to facilitate the transport of produce to market? Or were roads speculatively built to open up new areas for production? It is, of course, entirely possible that both processes were at work simultaneously. A few colonial and veteran settlement schemes aside, however, it seems implausible that the state had much involvement in such local infrastructure developments. Investment is likely to have been local—whether municipalities, private landowners, or even enterprising rural collectives.

Another indicator that the mid-republican consular roads did not open up the rural communities of South Etruria to the wider economy until centuries after their construction comes from the evidence of 'road stations'. Examples such as Aquaviva on the Via Flaminia did not develop on the consular roads until the late republican and early imperial period.[45] Did increasing traffic along these roads stimulate investment in facilities at these sites? Or was investment made in order to attract travellers? Some road stations seem also to have served central-place functions (e.g. Ad Bacanas)—did these sites drive local economic development or reflect it? And who was responsible for this investment? Landowners? Freedmen? Local collectives? Or even civic elites asserting control over emergent rivals on the municipal peripheries?[46]

As Hitchner observes in relation to Tunisia, it is difficult to separate cause and effect and it might be better to suggest that the relationship between investment in roads, road stations and rural economic growth was recursive.[47] Nonetheless, the evidence from South Etruria suggests some nuances, including the potentially vital role of local investment in the transformation of state infrastructure. For a farmer in South Etruria, being connected to Rome by a consular road may not have been a golden opportunity in 200 BC; indeed, it might have entailed disruption—exposure to passing armies and bandits, and visibility to the state. But for a farmer working the same land 200 years later, the subsequent growth of Rome's population and the stability of the *pax romana* transformed the significance of that road link. It was now a privileged route to the largest market of the ancient world. In other words, infrastructure does

45 Johnson et al. (2004), Potter et al. (1999).

46 For similar settlements south of Rome—small towns, markets and road stations—which developed on the Via Appia in the Pontine Marshes, see Tol et al. (2014).

47 Hitchner (2012).

not automatically integrate rural landscapes; other factors (local or global) may first have to come into effect. This long-term 'dialogue' of global and local is an example of the hybridized 'global countryside'.

But what about those areas which were not linked into this new road network? In his discussion of roads and connectivity, Hitchner also briefly observes that new connections can create new marginalities, as trade and people are drawn away from existing routes and regions leaving them more isolated.[48] Similarly in South Etruria, Potter argues that the bypassing of important centres (e.g. Falerii Veteres and Veii) undermined their local functions.[49] It is not clear, however, that such bypassing was specifically responsible for decline as many suburban towns which *were* incorporated into the consular road network did not prosper in this period either. Arguably, if roads were responsible, for decline it was the subsequent development of these long-distance roads into local networks—as outlined above—which allowed the metropolis to usurp the local marketing functions of suburban towns.[50] Further afield in Italy, we find other urban centres whose economic fortunes cannot be predicted simply on the basis of their inclusion or exclusion from new road schemes; for example, in southern Italy, Botromagno declined rapidly from the 3rd century BC after it was connected by the Via Appia to the route from Rome to Brundisium.[51]

Also south of Rome, the Liri valley provides another case study. In 328 BC, the Latin colony of Fregellae was founded in the valley close to the existing *municipia* of Aquinum and Casinum;[52] a second colony was founded at Interamna Lirenas in 312 BC.[53] As the military frontier subsequently advanced further into Samnium, the valley was left to develop as an agricultural territory and communications route;[54] the Via Latina which passes through the valley was completed around the mid-3rd century BC.[55] The colonies, however, do not appear to have developed and thrived in the same way as the pre-existing centres.[56] Wightman suggests one reason that the colonies failed to prosper was the later realignment of the Via Latina south-east of Aquinum, so that it

48 Hitchner (2012, 231).
49 Potter (1979, 116–120).
50 Morley (1996, 180).
51 Small (1992, 15).
52 Livy 8.22.1.
53 Livy 9.28.8.
54 Wightman and Hayes (1994, 35).
55 Wightman (1994, 31).
56 Hayes and Martini (1994, 71).

bypassed the colony of Interamna and linked directly with the *municipium* of Casinum.[57] But cause and effect are hard to disentangle. It might equally be possible that the road was realigned because Interamna and its territory had not developed (field survey results suggest that the territory along the more direct route from Aquinum to Casinum was more densely settled by the 2nd and 1st centuries BC than the territory along the alternate route via Interamna). Either way, despite the investment in the colonies, in roads and land division, economic activity reverted to the pre-existing axis. On a still wider scale, despite the valley's potential as a communications route between Rome and Campania—as it is today—the route was eclipsed by the Via Appia, closer to the coast, effectively by-passing the valley as whole.

The new project at Interamna will undoubtedly shed light on these matters.[58] Until then, we may note the following points. First, investment in roads and rural infrastructure did not automatically or instantly integrate rural communities or stimulate economic development. Attempts to redraw local geography were not always successful or permanent. Second, integration—and marginalization—operate at a variety of spatial scales. And, thirdly, it should be recalled that many of the Roman roads of Italy simply formalized pre-existing routes; connectivity was not a new invention and is hence not a default explanation for integration.[59] In summary, it was not the creation of new connections that was important, but how they connected with wider networks, their intensity of use, and ongoing investment (e.g. paving, bridge-building and general maintenance). Most importantly, however, it is what and whom they connected.

Ports

Port installations, like roads and road stations, also demonstrate evidence for significant investment. Was this investment intended to drive rural integration and economic development? Or did the construction of ports reflect established exchange networks and economic activity? Again, separating cause and effect is difficult. The substantial Claudian and Trajanic investment at Rome's most elaborate port facility, Portus, follows—and therefore reflects—the period of Rome's most rapid economic and demographic expansion. Portus, however, cannot be viewed in isolation and earlier investment in Puteoli and Ostia must also be taken into account. This wider system may more

57 Wightman (1994, 32).

58 Bellini et al. (2014).

59 E.g. the Via Appia in southern Italy (Vinson (1972, 87)), Etruria (Frederiksen and Ward Perkins (1957, 187)).

closely track—or even drive—the growth of Rome. In other words, as with roads, multiple scales of analysis are vital for proper assessment of cause and effect.

Further south, the foundation of the colony and port of Brundisium in 246 BC seems to have radically transformed the pre-existing settlement hierarchy of south-east Italy. The colony established itself as the dominant regional economic centre by wresting control from Tarentum of links with the East Mediterranean; having lost this monopoly, the latter declined.[60] An important part of Brundisium's dominance was the development, in its hinterland during the 2nd century BC, of an articulated agricultural economy, exporting surplus wine and oil to Adriatic and East Mediterranean markets.[61]

What were the effects on nearby areas? Small pre-existing urban centres, both inland (such as Uria) and on the coast (e.g. Mutatio Valentia), declined in size and importance;[62] at the same time, rural settlement in their hinterlands experienced a slight decline in numbers, though average site sizes increased suggesting rural agglomeration. One interpretation is that the strong centralizing influence of Brundisium undermined the local market functions and manufacturing capacity of these towns. Regional integration into the wider Roman economy led to new agricultural regimes based on larger farms, increased efficiency, and specialization aimed at market-oriented cash-cropping for the overseas market.[63] This makes for a coherent narrative. In reality, however, it is difficult to assign causation in this way. The declining fortunes of Tarentum and Uria were hardly unique in the Greek south and cycles of rural growth and decline can be traced back to at least the 8th century BC.[64] We might therefore question whether or not the waxing and waning fortunes of local urban and rural landscapes would have occurred regardless of the successful foundation of Brundisium.

Finally, it is worth looking at smaller river ports—for example, Ocriculum and Castellum Amerinum both located on the middle Tiber. Ocriculum was one of a number of Archaic centres strategically located along the river between Rome and the border with Umbria, perhaps dating back as far as the 8th century BC.[65] By the late republican period, however, it was the only cen-

60 A similar situation followed the replacement of Neapolis by Puteoli as the premier Campanian port (Nicolet (1994, 630)).
61 Aprosio (2008, 103–120); Yntema (2014).
62 Boersma et al. (1991, 128–129); Yntema (1993, 195 and 210).
63 Yntema (1993, 204–208).
64 Burgers (1998).
65 Hay et al. (2013).

tre (with the possible exception of Seperna) left in occupation. Moreover, it had expanded to become a significant urban centre controlling the growing river trade downstream to Rome via the Porto dell'Olio. Goods included olive oil from the wider hinterland, as well as timber from the upper Tiber valley, and presumably a wide range of other products such as finewares,[66] millstones[67] and wine in Spello amphorae. But why did this Archaic site survive and prosper while the others disappeared? Key to Ocriculum's success was its good fortune to lie on the route of the Via Flaminia constructed in the late 3rd century BC. While the other Tiber centres fell out of occupation (the river was no longer a frontier), the crossing point of the Flaminia at Ocriculum provided a strategic link which sustained the settlement. With the expansion of the Rome market in the 2nd and 1st centuries BC, Ocriculum found itself in a strong position to capitalise again on its river connection—and the lack of any rivals—to greatly expand its economic role and urban infrastructure.

Castellum Amerinum was a much smaller site and developed at a previously unoccupied location.[68] It was positioned where the Via Amerina (built after 171 BC) crossed the Tiber and, in some respects, might be equally well classified as a road station-on-a-river and hence considered alongside settlements such as Ad Bacanas or Aquaviva. The small port appears to have developed two or more generations after the road was first laid out. Here, the combination of road and river became an obvious place for a facility to provide services to both land and waterborne traffic, but its development did not immediately follow the construction of the road. It was presumably, again, the growth of the Rome market and the consequent increase in traffic which transformed the potential of the location. Whether it took speculative investment to capture that trade or whether investment was attracted to existing activity at the crossing point is unclear.

These two examples suggest that the development of river ports may be closely related to the road network. It was, however, wider shifts in economic environment—sometimes much later—which determined whether these newly-created river/road intersections would develop as ports. The examples discussed here stress the difficulty of isolating cause and effect and the importance of considering connectivity across spatial and chronological scales. Road building changed geographies, but not in uniform or predictable ways because roads were built with varied motives through diverse environments and social

66 E.g. from Scoppieto (Bergamini (2007)).

67 E.g. via the Paglia (Antonelli et al. (2011)).

68 Johnson et al. (2004).

geographies. The relationships again seem to be better understood as evolving and recursive and, in turn, this helps to explain the diversity of the 'global' Roman countryside.

Going Off-Road

Roman roads, whether paved—or more commonly—unpaved, structured the movement of people and goods around the Italian peninsula. There were, however, other forms of mobility that are less archaeologically visible but no less significant. Importantly, *tratturi* or transhumance routes connected the mountainous interior to the coastal plains, and served to integrate upland populations and lowland economies. Some mountainous areas appear to have been increasingly connected into the wider economy: for example, field survey at Cicolano in the mountains to the north-east of Rome has identified small amounts of terra sigillata (but no Republican black gloss ware). The surveyors argue that this represents the integration of this upland region via the expansion of transhumance during the imperial period.[69] Similarly, the upper Sangro valley to the east of Rome became an important crossroads of north-south/east-west communications, offering extensive mountain pasture and forest resources. The construction of a large 'villa' complex, located far from the nearest towns of Atina and Aufidena, suggests some central management of these resources and an inscription indicates the presence of a well-known south Italian landowning family, the Babulli.[70] Investment in infrastructure is also suggested by the construction of a nearby terraced roadway through the narrow gorge of the upper valley.[71]

In some cases, such improved routes may have provided the means to continue or even expand existing upland practices. In the Andorran Pyrenees, for example, Orengo et al. have suggested that the construction of a road, linking an upland area to a new urban market, served to integrate pre-existing pitch production into the wider 'globalising Roman economy' (the term used by the authors).[72] Such investment and integration offered upland communities the 'opportunity' to integrate. But just as on the coasts of Etruria and Campania, where wine production dramatically declined as provincial producers entered the market, such integration could bring vulnerability to events playing out elsewhere, for example a decline in the demand for pitch. A more recent parallel is the abolition of feudalism in Central Italy in 1806, which had the effect of

69 Barker and Grant (1991).

70 CIL X, 5146.

71 Kane and Witcher (2013); Lloyd et al. (1997).

72 Orengo et al. (2013).

curtailing the long-distance movement of sheep from mountains to the coastal plains, leading to dramatic shifts in economic activity in the Apennines, including a significant increase in the maximum elevation of agriculture.[73]

Connectivity via roads, ports and *tratturi* was a vital element of the integration of rural populations into the 'global' Roman economy—but connectivity was not a Roman invention. People, goods and animals had moved around the Italian peninsula for millennia. It is therefore important to establish whether Roman infrastructure and economic practices represent an intensification of pre-existing trends (e.g. more people become more mobile) or a more profound transformation (e.g. new kinds of mobility, connecting new places, with new effects) in order to assess more accurately the impact of the Roman economy on rural populations.

4 Communities

As noted in the introduction, scholars of 18th century social and economic history do not agree on the interpretation of rural integration/isolation. Some argue that urban populations became richer; others argue that rural populations became poorer. Both groups assume that integration was something done (or not done) to rural populations. This conceives of integration and the drivers of change as exogenous and rural populations as passive. Certainly the confiscation and redistribution of land for Roman colonies constituted a dramatic external intervention, but it was far from the universal experience. Moreover, the tendency to see rural populations as unchanging, responding only to external intervention, has been thoroughly debunked. Horden and Purcell have tackled stereotypes of 'Mediterranean countrymen' and stressed the dynamic nature of rural societies.[74] In reality, they rarely remained isolated or unchanged for more than a few decades.[75]

What role might rural communities have played in seeking or shaping their own integration? Studying the 18th century, Bayly has reasserted the centrality of demography—and specifically population growth—as a key driver of the integration of rural populations.[76] He argues that population has been inexplicably redacted as an explanation from economic history.[77] Clearly the question

73 Manzi (2012).

74 Horden and Purcell (2000).

75 See also Witcher (2006b); Taylor (2013).

76 Bayly (2004).

77 Though archaeologists of other periods and places are actively arguing for the need to dislodge demography as the primary explanation of change, e.g. Robin (2013).

of whether or not the population of Roman Italy was stable, expanding or contracting at any one moment is a vexed question.[78] One reason that the 'size debate' has drawn so much attention is because of the significant implications in terms of the status of rural populations.[79] It impinges on issues such as the (im)balance of population and resources, urbanization, migration, economic growth and changing living standards. But perhaps most important to note is that these demographic trends were largely driven by rural populations and the decisions they made about how to respond to changing population numbers. In other words, rural populations, driven by factors beyond the control of outsiders, could integrate themselves into wider economic networks, switching between 'closed' and 'open' modes as populations declined or expanded.[80]

Likewise, accepting the possibility that rural populations were not just producers, but also consumers has implications for integration.[81] In aggregate they were the largest body of potential consumers.[82] Of course, such potential had to be transformed into reality by aspiration for an urban or Roman lifestyle (which was far from universal) and the resulting solutions may not have integrated rural populations into the wider economy. Indeed, De Ligt shows how villages may have emerged in response to rural demand but had the effect of inhibiting integration into larger economic networks.[83] Other populations will have found new possibilities via markets or—as recently suggested by the Roman Peasant Project—by linking into the wider economy through villas.[84] It might even be possible to argue the case for rural populations creating, in effect, small and temporary urban concentrations, such as Amiternum or Forum Novum in Sabina[85] in order to integrate themselves into the wider economy.

A related issue concerns the treatment of rural populations as an undifferentiated group. In reality, rural populations are usually structured as multiple and overlapping sub-groups based on clans, territories or wealth. If rural populations are permitted agency to influence their own integration, it is also necessary to allow for the possibility that there were varied and perhaps conflicting attitudes towards change. Moreover, despite the tendency to perceive

78 *Inter alia* de Ligt (2012a); Launaro (2011a); Scheidel (2008).
79 Witcher (2011).
80 See Viazzo (1989).
81 See De Haas (this volume).
82 De Ligt (1990).
83 De Ligt (1993).
84 Vaccaro et al. (2013).
85 Gaffney et al. (2001).

rural and urban as opposing groups with different attitudes and lifestyles, in pre-industrial societies townsfolk tend to remain deeply embedded in rural life, and individuals and families may move back and forth seasonally or through the lifecycle. Much of the integration attributed to towns may therefore be better understood to have been effected by wider communities rather than specifically urban or rural groups.[86] This does not mean, however, that the distinction between urban and rural was not potentially significant—indeed, it might be deployed as a social strategy—but rather that the distinction might be better treated as a subject for investigation rather than a starting assumption.

At a general level, we can see a positive correlation between the density of early imperial towns and the density of rural settlement.[87] Clearly, areas with higher urban densities are likely to have stronger influence on rural integration and vice versa,[88] but as towns were highly diverse, each could impact on and integrate rural populations in different ways. Case study selection therefore profoundly affects the patterns detected. The 'global countryside' provides the framework needed to accommodate this patchy and diverse situation. Archaeologists have often focused on colonial landscapes—marked by clear indicators of high-level intervention and radical transformation. But to take these colonial changes as indicative of the integration of local rural communities would be perverse—they could equally be envisaged as the replacement of existing rural populations with new, 'pre-integrated' communities. What about other, non-colonial, contexts? Two contrasting models of rural integration illustrate some of the diversity of urban-rural relations and, in particular, the role of social and political drivers and their economic consequences.

In *Cities and landscapes*, John Patterson provides a model which connects the rural settlement of upland Samnium with the evidence for emergent towns.[89] Patterson argues that the key driver of events following the Social War was the Samnite elite's aspiration to access and participate in political life in the Roman Senate. Vital to this ambition was wealth and prestige. The elite therefore turned to the only respectable and reliable source of wealth—land—and monopolized rural surpluses to fund local urban building schemes with which to demonstrate possession of appropriate cultural capital. Patterson suggests a process of estate agglomeration, pushing peasants into emergent towns and/or

86 Broadly the approach of Dyson (1992).

87 Mattingly and Witcher (2004).

88 E.g. compare North and South Etruria, Witcher (2006a).

89 Heinzelmann et al. (2010); Patterson (2006).

impoverishing them to the point of archaeological invisibility.[90] Here, urbanism was a local means to a global ends, but most importantly, the economic integration of rural Samnite communities was driven by the social ambitions of local elites. Although Patterson does not explore the idea, another way in which the elite could have extracted the necessary surplus would have been a shift towards pastoralism. But whether impoverishing peasants or replacing them with sheep, it is important to stress that this is not a form of structural underdevelopment as envisaged by World Systems Theory, whereby economic integration suppresses peripheral economies.[91] Rather, in Patterson's model, the integration and impoverishment of rural communities is part of the dialogue between local and global, driven by the social and political ambitions of local elites. This is an example of the 'global' Roman countryside in action.

The second example concerns the *suburbium* of Rome. There are many contrasts between Samnium and the *suburbium* in terms of their social and economic organization, including major differences in rural settlement densities, types, and distributions. Perhaps the most distinctive characteristic of the early imperial rural communities of the *suburbium*, however, concerns consumption. Rural sites, including small 'farms', made use of a much wider range of material culture when compared to contemporary sites in Samnium, including local, regional and imported pottery, glass and marble. This material culture is not only the same as that found in local towns, but also the same as that found at Rome, indicating a single, integrated marketing system. Large sections of the rural population of the *suburbium* not only aspired to a particular form of metropolitan lifestyle, they achieved it. Across Italy, Patterson has stressed the centrality of upward social mobility, for example, the adlection of individuals into, and up through, municipal hierarchies.[92] Such mobility was a particular feature of the densely urbanized *suburbium* with its prominent network of freedmen who became central to the maintenance of civic vitality. In this context, the archaeological evidence from the *suburbium* might be read not simply as economic integration, but also the successful imposition and/or imitation of a type of urban lifestyle in a rural context.

How different was this from the situation in Samnium? There, by comparison, urbanism was a more recent concept and involved more direct exploitation of rural populations. In such circumstances, the differences between urban

90 E.g. in the Biferno valley, rural site numbers decline, though it should be noted that the majority of abandonment concerns off-site and small domestic scatters, whereas most farms and villas continued, Lloyd (1995).

91 For a recent review, see Harding (2013).

92 Patterson (2006).

and rural populations were much more significant. Rural communities may have lacked the aspiration for urban lifestyles and/or the wealth to pay for it, but equally important the elite had a vested interest in marking out and reinforcing the difference between urban and rural. As recently suggested in the context of Roman North Africa, newly urban elites may have had strong motives for restricting the supply of urban goods to rural populations.[93] In Italy, the cultural distance between rural and urban was much greater in the newly and thinly urbanized region of Samnium than it was in the long and densely urbanized *suburbium*.

5 Conclusions

Many of the questions we wish to answer about the social and economic organization of the rural landscapes of Roman Italy are reflected in studies of other historical periods and through to the present day. Without losing sight of historical specificities, it is useful to explore some of the debates and concepts from these other contexts with a view to improving our understanding of the Roman past.

It has become clear that top-down 'grand narratives' fail to accommodate the diversity attested by over 50 years of archaeological survey. But, conversely, a plethora of bottom-up case studies obscures wider trends and underestimates connectivity. This chapter has outlined the notion of the 'global countryside'—defined by a series of descriptive characteristics—as a framework within which to accommodate both the particularities and the generalities. The challenge then moves to explanation. Here, the examples of connectivity and community have been used to illustrate some of the issues. For example, roads may be imposed by the state, but can be repurposed for local use or rerouted back to pre-existing axes. In the process, some people (both local and external) may have found opportunities to enhance social status and wealth; others may have found themselves increasingly marginalized—socially (exploited by emergent elites or by new absentee landlords) or physically (as a new road in a neighbouring valley redrew the economic geography of a region). But the integration of rural communities into the expanding Roman economy need not only have been initiated by external interventions such as road building. Impetus could also come from within rural communities whether as a result of growing population (e.g. importing resources or exporting population) or the ambition of

93 Dossey (2010).

individuals and families at others' expense (e.g. promoting urbanization or imitating elites). Given the many costs of such integration (e.g. increased dependency, external ownership of land, migration, the monopolization of social power, social polarization, changing agricultural strategies, etc.) we need to acknowledge the powerful forces pulling (e.g. the Roman state) and pushing (e.g. local elites) rural communities to integrate more closely. These processes played out in different ways in each locality and help to explain the socially and geographically diverse character of Roman rural integration.

In these ways, it becomes impossible to talk about 'the' Roman countryside, or to answer with certainty questions about whether or not the state or urban populations drove rural integration or whether investment in infrastructure stimulated economic development. What the 'global countryside' approach offers, however, is the opportunity to understand the Roman period in much broader spatial and chronological context than is usually the case. For example, to assess properly the mobility of the population of Roman Italy requires understanding of mobility in earlier and subsequent periods. Similarly, to understand whether investment in infrastructure and economic growth are causally linked, demands knowledge of long-term and macro-regional trends of population, settlement and agricultural production. In many cases, the quality of our evidence for the Roman period has caused us to neglect the less abundant and more fragmented evidence for earlier and subsequent periods against which the Roman period must be measured. Most importantly, the notion of the 'global countryside' stresses the diverse social and political motivations for the economic integration of rural communities and the importance of recognising the agency of rural communities in integrating themselves.

CHAPTER 3

The Geography of Roman Italy and Its Implications for the Development of Rural Economies

Tymon de Haas

1 Introduction

Archaeological data has advanced our understanding of processes of economic development and integration of the Italian peninsula under the Roman Republic greatly over the past decades.[1] At the micro-scale, excavations shed light on changes in agricultural practices, while at the regional level, field surveys clearly illustrate that developments in settlement and land use followed diverse trajectories. Synthetic work based on such regional datasets in turn now helps us understand general social and demographic changes at the supra-regional level but stresses the variability in settlement developments within Roman Italy.[2] Material culture studies allow us to investigate systems of production and exchange of agricultural and other goods with new (quantified) methodologies.[3]

At the same time, our vision of the Italian countryside is still that of a landscape dotted with either increasing or declining numbers of farms and villas that served to feed the cities of Roman Italy, especially Rome. Such a vision, although here perhaps somewhat simplified, hardly does justice to the rich archaeological data that attest to the complexity and dynamics of rural landscapes. However perhaps even more importantly, the context of regional developments as provided by the physical and social geography of Roman Italy has hardly been considered so far in the evaluation of regional variations and general trends as observed in archaeological datasets.

In this chapter I argue that to assess regional variability and supra-regional trends in light of processes of economic development and integration, we need to understand how geographic factors affected such processes: did the physical landscape determine the kinds of economic activities that developed

1 Morel (2007); De Ligt (2010); Patterson (2010).

2 Ikeguchi (2000); Launaro (2011a).

3 Mattingly and Salmon (2001a); Scheidel et al. (2008); Bowman and Wilson (2009b, 2011 and 2013).

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in specific areas? How did demographic conditions affect the scale and nature of these activities? Moreover, how did infrastructural developments change the ways in which regions were settled, exploited, and integrated? By applying principles from economic geography, we can consider the links between such aspects of the ancient economy that are now often considered in isolation and/or aspatial. This allows us to broaden the discussion of the Italian economy (that now focuses mainly on Rome) and to consider the role of different parts of the peninsula as regional systems that increasingly integrated into a single economic system.

A thorough study of this kind requires both detailed regional archaeological studies that combine diachronic studies of settlement patterns, population trends, infrastructural developments, and resource exploitation (agricultural and non-agricultural), and a systematic comparison of such regional studies, a highly ambitious task that is beyond the scope of this chapter. Here I apply principles from economic geography to assess the geography of the main economic characteristics of Roman Italy at a general level: the peninsula's demographic structure, its infrastructural networks and its productive potential. The aim of these analyses, based on several synthetic archaeological datasets and GIS-based spatial analysis tools, is twofold: firstly, to outline the general economic geographic characteristics of the peninsula; and secondly, to generate hypotheses on how (changes in) the economic geography inhibited or promoted economic development and integration. These hypotheses should be tested in the future through a comparison of detailed regional case studies. Thus, the analyses presented here provide an outline of the economic geography of Roman Italy and serve as a broader context for the other chapters in this volume.

Firstly, I discuss the economic geographical theory and principles which I use as well as the data and spatial analysis tools. Next, I address the components of the economic system and their relationship to the geography of Roman Italy in order to identify the main variations in geographic conditions within the peninsula with respect to demand, distribution, circulation and production. I conclude with a discussion of how the regional variability of all these factors together affected the economic development and integration of various parts of the Italian peninsula. I will argue that both population growth and increasingly elaborate infrastructural networks (over land, river and sea) provided the necessary preconditions for a high degree of economic integration; however, the geographic differences between regions certainly had a major effect on the nature and level of integration.

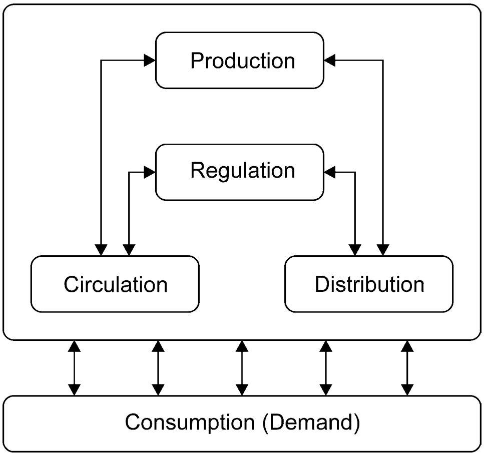

FIGURE 3.1 *Organization of the production system (after Dicken and Lloyd (1990, Fig. 1.3))*

2 Economic Systems and Their Spatial Organization: Theory, Approach and Limitations

Economic systems theory forms a useful starting point. It considers the economy as a system of interrelated processes (Fig. 3.1):

- The production process, in which inputs (e.g. raw materials) are transformed into outputs (e.g. finished products);
- The circulation process, which includes all activities that connect the various parts of the economic system (e.g. transportation and communication, financial systems, advertising);
- The distribution system, which includes all activities that make an output available to consumers (e.g. markets, retailing, wholesaling);
- The regulation process, which includes all ways in which the economic system is controlled (e.g. through institutions, laws and regulations);
- Demand, which is largely dependent on demographic conditions (e.g. population size and per capita incomes).

Economic geography is concerned with the spatial organization of such economic systems. It deals with issues such as the location and spatial impact of the different economic processes, their connections in space, and changes in economic systems through time and space.[4]

4 Dicken and Lloyd (1990, 7).

Several approaches exist within the field of economic geography, but here I will draw on Neoclassical location theory and two of its models that are well-known in the study of ancient societies. The first is the Isolated State Model, which models the location of different types of production on the basis of the optimum economic rent to be obtained at different distances from a market. It predicts a radially structured hinterland with horticulture and dairying, sylviculture, intensive arable farming, long ley arable farming, three field arable farming, and ranching at increasing distances from the market.[5] The second is Central Place Theory, which models the spatial organization of economic systems through the distribution of central places. While commonly used goods and services have a low threshold for profitable marketing and therefore are available at many small centres, rarer goods and services need a wider distributional range and are provided by fewer higher-order centres. These are organized hierarchically and distributed regularly over the landscape, with the higher-order centres being surrounded by lower order satellites.[6]

Some question the usefulness of these ideal-type models to study real-world landscapes with their complex physical geography, rejecting the idea that they are applicable to ancient societies with economies potentially based on mechanisms of exchange other than markets or doubt that humans operated on the basis of rational economic principles. In addition, the models are static in nature and therefore not well-suited to deal with the development of settlement patterns or to explain change in economic systems over time. Central Place Theory, finally, also presupposes a hierarchical organization that is less applicable to economic processes in which complementarity and specialization were important as in long-distance trade or the exploitation of rare resources.[7]

Some of these critiques concern the inherent limitations of any kind of abstract model, which of course have to be acknowledged but do not obstruct

5 Chisholm (1962, 18–24); Dicken and Lloyd (1990, 52–59).

6 Christaller's (1968) famous work provides three solutions for the optimum distribution of central places based on optimizing market areas, location with respect to roads, and location in light of administrative boundaries. Lösch (1954) provides a model perhaps better suited to real-world conditions in which larger cities may have different sets of functions and higher-order functions may also be provided at smaller centres. This leads to overlapping market areas with a sectoral layout in which some sectors have few and others many higher-order central places. This model in turn implies that the population was unevenly distributed and that transport was channelled through fixed routes.

7 These limitations have long been acknowledged (Hodder and Orton (1976)).

us from using them in a cautious way. Some points of critique are also valid, and can only be addressed by drawing on other theoretical approaches, such as New Economic Geography and Network Sciences. However even if these *models* cannot readily be applied, the ordering *principles* that underlie them are valid and indeed crucial to understand the economy of Roman Italy:

1) Economic exchange between places occurs if these places are complementary, that is, if production factors available in one place are not available in the other. In reality this is by default the case where it concerns labour and capital, and especially land: fertile agricultural land, pasture, minerals and woods are highly unevenly distributed within Roman Italy.
2) The friction (or cost) of distance is the primary ordering principle in economic exchange. As the costs of transport of inputs and outputs (e.g. between their source of origin, the market and the consumer) usually constitute the bulk of the costs of a product, they are also a primary factor in the location choice for the production and marketing of a good. Roman infrastructural developments therefore brought about profound changes to economic systems.
3) In both the production and the distribution process, there are benefits to agglomeration: where demand is concentrated, the minimum scale for profitable production is more easily reached. If demand is large enough, production may occur on a larger scale, which in turn increases labour productivity and creates economies of scale. Additionally, clustering of productive activities can lower production costs and thus can cause economies of agglomeration. Finally, agglomerations of production are attractive locations for commercial activities, and therefore important in distribution and regulation processes. Hence, variations in population density within Roman Italy will affect economic development.

The validity and usefulness of these principles has been made clear in archaeology and other regional sciences.[8] They have proven useful to understand ancient economies and have become particularly influential in Scandinavian and German archaeological scholarship.[9] Furthermore, approaches and models from economic geography have also been used in Roman studies, mainly drawing on written and/or epigraphic sources.[10] Thus far, only occasionally

8 Nakoinz (2012, 218); Mulligan et al. (2012).

9 Hirschel and Ludowici (2010); Nakoinz (2010, 251/252).

10 Hodder and Orton (1976, 55–65); Kunow (1988); Bekker Nielsen (1989); Lapin (2001, 78–82);

archaeological proxies (especially site size to determine hierarchical relations) have been considered, but as regional and supra-regional datasets become available, we can now also start to use these to better understand the economic geography of Roman Italy.[11]

The analysis of the geographic characteristics of demand, distribution, circulation and production I present below is based on several datasets. The main dataset is the *Barrington Atlas of the Greek and Roman World*, which provides an inventory of larger settlements (urban and non-urban) and the road network. Although this dataset is surely incomplete and will be more so for some regions than for others, I consider it consistent enough for Italy to study its urban settlement structure and its long-distance infrastructural networks.[12]

With other sources we can explore systematically specific aspects of the economic geography, although not necessarily on the same spatial scale. De Ligt's recent work on the demography of urban centres allows us to explore the distribution of urban demand over the entire peninsula.[13] For rural demand this is currently only possible for more restricted areas. Aspects of location choice in rural production, agricultural and non-agricultural, will equally only be studied at the regional scale, although we can make comparisons between some regions on the basis of the available evidence.[14]

I will analyse these sources, supplemented by evidence from individual regional studies and written sources with two approaches. The first departs from the abovementioned economic geographic principles: because the costs and returns related to (the friction of) distance are the ordering principle to allocate economic activities, they lend themselves well to be approached through GIS-based spatial analysis. I use cost surface analysis in order to better understand

Bintliff (2002); Preiser-Kapeller and Mitsiou (2010, 272–279); De Haas et al. (forthcoming). For Roman Italy, Neville Morley's *Metropolis and hinterland* is the primary example, which demonstrated the economic logic of intensive garden cultivation of perishable high value fruits, vegetables and flowers in close proximity to Rome, and the distribution of temporary markets (*nundinae*) in Campania, which would function as central places for local exchange Morley (1996, 83–90 and 166–174).

11 This means that I assume that the (rural) communities of Roman Italy were indeed engaged in economic systems through market exchange (cf. Bintliff (2002); Feinman and Garraty (2010)).

12 Talbert (2000); I have complemented this with information on ports and navigable rivers from De Graauw (2011) and Campbell (2012).

13 De Ligt (2012a).

14 Olcese (2012).

the distribution of cities and minor centres in light of Central Place Theory. Additional GIS tools are used to model the distribution of urban demand and its implications in terms of the potential for agglomeration effects. In order to assess the impact of connectivity on such central place landscapes, I use similar tools to investigate the accessibility of long-distance connections as provided by roads and rivers.

As suggested, some aspects of economic geography are not taken into account in traditional location theory. The role and complementarity of sites in infrastructural networks and their function in trade networks is one such aspect. Therefore, in addition I draw upon Network Theory to understand the structural properties of the road network, especially to identify regional subnetworks and to understand the role of sites as hubs in supra-regional exchange.

Before turning to these analyses, several issues need to be acknowledged. Firstly, I only deal with selected aspects of economic processes. For example, the circulation process entails more than just transport and infrastructure. In addition, I do not discuss the regulation process, in which Rome is of course especially important, both as the major market and as the centre from which regulatory processes were organized. Finally, the discussion also largely ignores the wider Mediterranean context. I fully acknowledge that these are issues crucial to the economic history of Roman Italy: state policies and centralized decisions shaped the Italian road network, brought about demographic shifts and transformed the productive capacity of regions through colonization and centuriation. The influx of goods and capital, the opportunities provided by new markets, and also the competition of new producers that entered the Italian market as a result of Roman imperial expansion profoundly influenced processes of economic development and integration. Nonetheless, mapping the geography of the peninsula itself is still an important first step towards understanding the potentially diverse impact of both Imperial expansion and regulatory processes.

A second remark concerns the potential and limitations of the data analysed here. These mostly do not allow us to study change over time, a crucial dimension of the impact of Roman expansion. Rather, they are mainly used here to identify static patterns and assess regional variability in light of the process of integration.

3 The Geography of Demand and Distribution: Regional Demographic Patterns and the Location of Markets

Demand forms the principal attractor of economic activities and facilitates economic growth as proximity to consumers lowers transport costs and the minimum scale for profitable production is reached sooner. The volume of demand depends first on the size of the population: a larger population implies a larger demand for basic goods and services and will lead to profitable local production and/or the supply of less commonly used goods and services. Wealth is a second important parameter in demand: higher per capita incomes imply a growing demand for higher-value goods. Thus, the size and wealth of the population define the potential for economic development in terms of agricultural and artisanal production, the provision of services, and trade. A first step to understand rural economic development is therefore an assessment of the distribution and prosperity of the Roman population, both rural and urban.

Estimates of the size of the Roman population vary widely and are hotly debated.[15] However in order to model demand, it is equally relevant to reconstruct relative changes in population over time and its distribution over space. These demographic characteristics are less controversial: many agree that the total population of Roman Italy grew steadily between the 3rd century BC and the 1st century AD. In traditional models, an increasing urban proletariat and rural slave population mainly account for this population growth. Because of a decline in the rural free population and lower average income levels, rural economies in particular would be characterized by a combination of large slave-run estates that produced for a large yet poor urban market and self-sufficient peasant farmers. This scenario implies aggregate economic growth, but not a highly developed rural economy.

However, recent scholarship not only suggests that the rural free population did grow, but also that this population growth may have gone hand in hand with per capita growth. This scenario certainly implies a more developed rural economy: demand for goods with a high income elasticity, such as meat, imported goods, table wares and other higher-end crafts products rose, and would lead to a diversification of rural production and trade.[16]

In order to analyse the distribution of urban demand, the primary motor for economic development, I use De Ligt's town-size figures in the Augustan

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15 Low counts estimate the total population at 5 to 7 million, high counts at c. 14 million, a middle count puts the number at 7.5 to 10 million (Launaro (2011a); De Ligt (2012a); Hin (2013)).

16 See contributions in Bowman and Wilson (2009b) and *Facta* 5 (2011); Jongman (2014).

age.[17] I consider these a valid proxy for the size of the urban population and use them to reconstruct the distribution of the urban population of Roman Italy (Fig. 3.2a). In order to estimate the impact of urban demand on rural areas, I also use the concept of *population potential*. This concept quantifies the potential (economic) interaction between a place and its surroundings as a function of the centre's population size and the distance to it (Fig. 3.2b).[18]

Together, Figures 3.2a and b show how urban demand varied within the peninsula.[19] Latium and Campania (regio I), Picenum and Umbria/Ager Gallicus (regio V/VI) as well as the coastal part of Venetia et Histria (regio X) and southern Etruria (regio VII) had a particularly large volume of urban demand and therefore a large impact on rural areas. In these regions profitable agricultural production for urban markets was feasible in large—and in Latium and Campania continuous—areas. Demand for goods and services was large enough for many of them to be produced and/or provided locally, and multiple producers could share such local markets. In addition, as urban centres were closely spaced in these areas, a cumulative market could arise: urban centres could complement each other by producing and marketing different goods and services, and smaller secondary centres could also provide specialized goods and services to larger nearby centres. Thus, these highly urbanized regions had a high potential for internal interaction and are characterized by well-developed and integrated rural economies.[20]

At the same time, the size and distribution of urban demand still varied considerably within these regions. Latium was dominated by the megalopolis of Rome; other centres were closely spaced but generally small.[21] This implies a high level of integration, especially in proximity to and focused on Rome. In Campania, urban centres are even more closely spaced and on average also

17 De Ligt (2012a, Appendices I and II).

18 Dicken and Lloyd (1990, 181–182). I have used the kernel density tool in ArcGIS 10, which provides such a model that can take into account city size figures. Another potentially useful concept is that of *market potential*, which takes into account not only population size but also variations in income (Dicken and Lloyd (1990, 182–183)). Although difficult to quantify, market potential may have risen with the inflow of the spoils of conquest, and may have been larger in core cities, which profited most from state revenues. In rural areas with a large proportion of free citizens, market potential would likewise have been larger than in areas with mainly slave-based villa estates.

19 As centres in adjacent Alpine areas are not included, edge effects may occur in the North. However, as the number and density of centres is low in these uplands, the biases these edge effects cause are very limited.

20 Dicken and Lloyd (1990, 171–173 and 207–208); Bekker Nielsen (1989, 30).

21 See Morley (1996, 62/map 1).

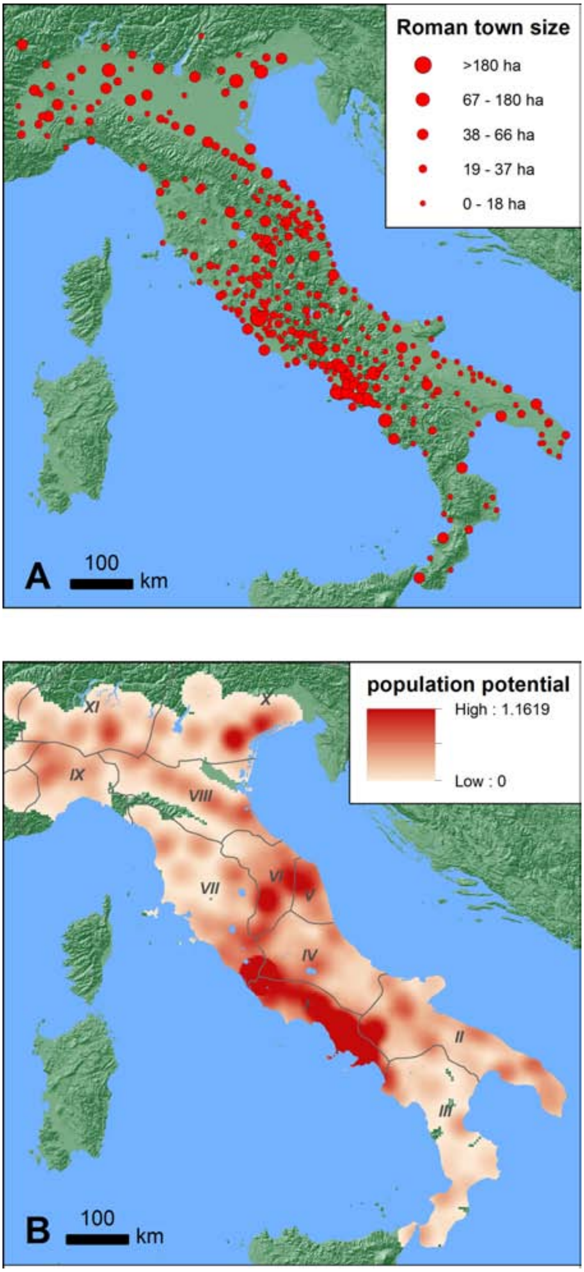

FIGURE 3.2 *Distribution of urban populations in Roman Italy: town size figures as proxies* (*a*) *and derived estimates of population potential* (*approximate boundaries of the Augustan regions in grey*) (*b*)

larger. Urban demand was therefore more evenly distributed than in Latium, and consequently economic development depended less on the distance from the nearest centre, but was rather conditioned by a large interconnected regional market.[22] In Picenum and adjacent parts of Umbria and the Ager Gallicus, centres were generally small and their impact was therefore primarily local, but their proximity suggests that a certain degree of regional integration occurred.[23]

In other parts of the peninsula urban potential was more restricted as urban centres were on average small and more widely spaced.[24] Northern Italy (regio IX, X, XI), Etruria (regio VII), Samnium (regio IV) and Apulia/Calabria (regio II) show 'hotspots' of demand provided by large urban centres; as some of these were connected along roads and major rivers (see below), these may have formed more integrated markets. Large parts of these areas, however, had very few and small urban centres and therefore generated far less demand. In Lucania and Bruttium (regio III), northern Etruria (regio VII), the Alps and parts of Aemilia (regio VIII) and Liguria (regio IX), urban demand was particularly low. However, while regional demand limited the potential for rural economic development, these regions could develop specific forms of agriculture or resource exploitation that allowed them to be integrated into supra-regional economic networks (see below).

Although urban demand was the primary motor for economic development, rural populations were considerably larger and therefore provided an even larger volume of demand than urban populations.[25] Even if these rural populations obtained fewer foodstuffs through market exchange, they did require crafts products and services in, on aggregate, large volumes. Under conditions of per capita growth, they would also consume considerable quantities of goods with a high income elasticity of demand. Therefore, the rural population surely formed an even larger market than the urban population.

Field survey data potentially provide a basis to reconstruct the relative size and distribution of the rural population, its development over time and its changing social structure (with implications for the types of demand it

22 Morley (1996); De Ligt (2012b, 184–185). More cities may fall within the range of one or multiple producers, and the potential for intervening opportunities was even higher.

23 De Ligt (2012b, 188).

24 De Ligt (2012b, 186–187).

25 Likely urbanization rates for pre-industrial societies imply that (with the exception of some regions and periods) the urban population rarely exceeded 20% of the total population (De Ligt (2012a, 211–213)).

provided). However, methodological difficulties have thus far impeded such endeavours at the scale of the entire peninsula, and at present any reconstruction is patchy.[26] Mattingly and Witcher's comparison of rural site inventories in the *Forma Italiae* volumes enables us to cautiously evaluate the differences in rural site numbers and, by extension, in the volume of rural demand for some regions.[27] For Latium, they have shown that rural site densities were particularly high within a zone of 20 to 25 km around Rome and lower in a zone between 25 and 90 km from Rome. This fall-off pattern confirms the dominance of Rome as a market, but also points to a considerable concentration of demand in its surroundings. Furthermore, their analysis suggests that high rural site densities generally correlate with the more urbanized areas of Latium and Campania, where urban demand necessitated large-scale surplus extraction and intensive cultivation of the countryside.[28] Therefore, those working the land were able to benefit from the urban market and in turn formed a market for urban goods and services. Rural site densities were lower in less urbanized regions, especially in coastal Etruria and Apulia, which suggests that the potential for economic development in these areas in terms of demand was limited.

Whilst the analysis by Mattingly and Witcher does not account for diachronic change, Alessandro Launaro's analysis of 27 field survey datasets highlights some general developments and regional exceptions in population size and social structure.[29] If we accept the use of settlement trend data as a proxy for demographic developments, his work suggests that both in highly and less urbanized areas rural demand grew between the late Republican and early Imperial period. Notable exceptions are (again) parts of Etruria and Apulia, where market potential was not only small, but also decreased over time. As in many parts of Roman Italy not only villas (proxies for slave populations) become more numerous, but also farms (proxies for free populations), he suggests the free population also increased.[30] Although a growing free pop-

26 Alcock and Cherry (2004b); the comparative reconstruction of absolute population figures is currently certainly beyond what survey publications allow (Osborne (2004); Jongman (2009)).

27 Mattingly and Witcher (2004, 177–179), with cautionary remarks.

28 Mattingly and Witcher (2004, 179–183). This comparison accounts for variations in survey intensity.

29 Launaro (2011a: 151–155). Some of the datasets he draws on are too small to reliably reconstruct demographic trends.

30 Launaro (2011b). Archaeological data do not allow an assessment of whether such peasants were smallholders, tenants or sharecroppers (Foxhall (1990)).

ulation did not necessarily become more prosperous, it is likely that rural demand increased and also became more varied over time and that some groups consumed higher-value goods. Once again, rural population decline mainly affected the free population only in parts of Etruria and Apulia. This would have additional adverse effects on rural demand and favour the rise of large estates exploiting these areas for export markets (see below).

Urban and rural demand therefore varied considerably within the Italian peninsula: some regions had few or no urban centres and their rural populations were small, while other areas possessed more but widely spaced urban centres and varying levels of rural demand. In yet others, urban and rural population potential was high and must have led to the development of complex and highly integrated rural economies. In fact, the variations in demand not only have implications for the development and integration of rural economies, but also for the role of rural markets in the distribution process.

Spatial analysis again helps to understand the distribution and accessibility of urban and non-urban centres, and the extent to which they were used as markets in the distribution process (Fig. 3.3). If we model the servicing area of urban markets as areas within a two-hours walk (e.g. a half-day's return journey, red areas in Fig. 3.3a)[31], it becomes clear that markets were indeed variously organized and distributed.[32] In large parts of the peninsula urban centres were simply too far away to serve as regular market places for rural populations. In such areas rural demand must have been met by either permanent or temporary rural markets.[33] Minor centres[34] (black dots in Fig. 3.3) occur throughout the peninsula and are often situated at walking distances of more than two hours from urban sites. This suggests that especially in less urbanized parts of the peninsula such as southern Italy, northern Etruria and the Po Valley, rural communities were serviced by these minor centres, perhaps supplemented by large private estates and sanctuaries.

31 This is a commonly used threshold for the distance consumers are willing to travel to regularly visit markets (Bintliff (2002, 216–217)).

32 I have generated these two hour walking distance buffers using a slope model (90 m resolution) and a modified version of the Tobler cost function (cf. Herzog (2013)).

33 De Ligt (1993); Frayn (1993).

34 I use this term to refer to all sites that are not (historically) attested as towns in a legal sense (listed in De Ligt (2012a)), including villages, *vici*, and road stations. Some minor centres may actually have been larger than certain urban sites (for a discussion, see Tol et al. (2014) and Santoro (this volume)).

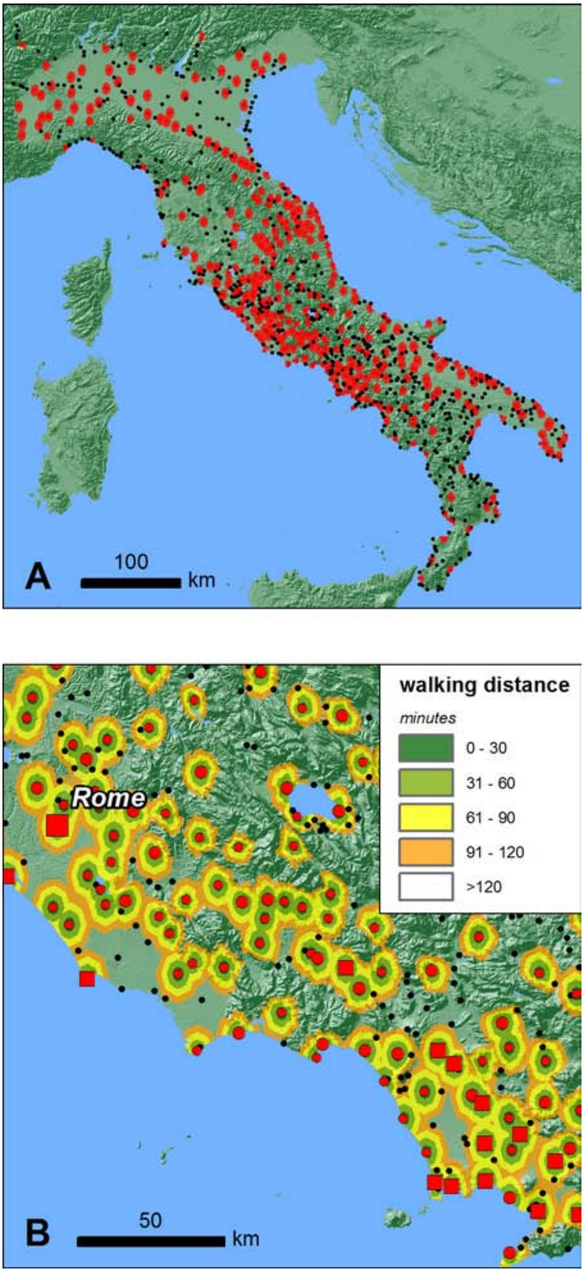

FIGURE 3.3 *Distribution of minor centres (black dots) in Italy (A) and Lazio and Campania (B) in relation to two hours' walking distance buffers (red in A) around urban centres*

Significantly, minor centres also occur in highly urbanized regions such as Latium and Campania (Fig. 3.3b). Here their role as markets may, following the principles of Central Place Theory, be explained by an additional mechanism: in these areas with large population, demand was such that even within short distance from primary markets lower-order centres provided goods and services. The distribution of minor centres in Latium and Campania seems to confirm this: while some are situated beyond daily commuting distance from towns (and thus serviced remote areas), others occur at one to two hours' walking distance from urban markets. As we will see below, however, these minor centres could also have functions that complemented those of nearby towns, particularly as hubs within transportation and trade networks.

4 Integrating Local and Regional Market Systems: The Circulation Process and Infrastructure

The physical geography of the Italian peninsula provided the basic parameters in the development of regional cultural and exchange networks.[35] The Apennine Mountains as a natural barrier divided the Italian peninsula into natural regions, most of which were relatively self-contained.[36] Infrastructure, especially ports, rivers and roads, enhanced possibilities for communication and exchange.[37] Likewise maritime (coastal) routes decreased the friction of distance; coastal hubs provided access to long-distance maritime networks and stimulated export from areas of low demand. Together, roads, rivers and ports therefore connected rural areas of production with urban and overseas markets and at the same time opened up these rural areas as markets. They limited the restraints on integration posed by physical geographical barriers.

Rivers and Ports

The distribution of perennial rivers and ports offered variable potential for economic integration (Fig. 3.4).[38] The Po Valley had the most extensive river

35 Rome's rise can clearly not be explained without considering its favourable position near the Tyrrhenian coast on an ancient route from Etruria to Campania, and on the third longest river of Italy (Morel (2007); Tuck (2013)).

36 Stoddart (2010).

37 The cost ratio sea:river:road transport is often estimated at c. 1:5:25 (Morley (1996, 64–65); Campbell (2012, 215–217)).

38 The rivers shown in Fig. 3.4 include those mentioned in written sources as navigable

FIGURE 3.4 *Roads, rivers and ports in Roman Italy*

system, and some rivers were navigable for hundreds of kilometres inland. This system favoured low-cost riverine transport and increased the integration of extensive rural hinterlands and the major towns of the region, which as we have

(Campbell (2012)) and those included in the Barrington Atlas as perennial (data available via http://awmc.unc.edu/wordpress/map-files/ (accessed 16-11-2012)). The ports presented in Fig. 3.4 are modified from De Grauw (2011) and from http://www.ostia-antica.org/med/med.htm#app (accessed 04-01-2013). For river ports, especially in the Tiber valley, see Campbell (2012, 300–302) and Patterson (2004, 63–64). The data include archaeological, toponymic and historical data and may well be biased, especially with respect to the smaller river ports. Some of the southern Italian and Etrurian ports are possibly of pre-Roman rather than Roman date.

seen, were quite distant from one another. Via ports on the Adriatic coast, the Po Valley also had access to wider exchange networks.[39]

The central Adriatic coast is characterized by narrow river valleys with small coastal plains that favoured local communication within the valleys. Through coastal ports, some of these valleys were connected to wider exchange networks, and such connections were crucial to profitably market wine and other products from these areas.[40] The Apulian plateau, Calabria, Lucania and Bruttium, and Liguria virtually lacked major perennial rivers. Therefore, transport between the large coastal plains and interior uplands was costly. These areas also had few ports through which they could tap into wider exchange networks.

The hydrography of the Tyrrhenian coast provided better opportunities to integrate inland zones and highly urbanized coastal areas; its coastal plains are traversed by long rivers, including the Volturnus, the Liris, the Tiber (with its major tributaries the Nar and Anio) and the Arnus. These rivers were perennial and in view of the presence of river ports (especially on the Tiber) were certainly navigable up to considerable distances inland. The numerous coastal ports also provided connections to the wider Mediterranean (Fig. 3.4). Hence, we may expect that the quantities and range of imported goods available in this core area, both in urban and rural areas, were greater than in other less connected areas.

Roads

While roads and tracks surely existed before, the creation of a carefully planned road network from the 4th century BC onwards improved natural connections within Italy. These solidly constructed and regularly maintained roads could be used year-round, reduced transport costs and travelling time, and therefore, to some extent, contributed to time-space convergence.[41] While the construction of these roads is generally considered to have had a primarily military scope, they also clearly facilitated trade. On a regional level, they made the marketing of goods profitable over longer distances, but they also provided corridors between natural regions and therefore improved supra-regional integration.[42]

The first major roads (the Via Latina, the Via Appia, the Via Tiburtina and the Via Salaria) were built in the later 4th century BC. They connected Rome with

39 See also Santoro (this volume).

40 Van Limbergen et al. (this volume).

41 Laurence (1998).

42 Laurence (1998 and 1999, 187–199).

the major centres of Latium, Campania and the Sabina, areas with which Rome had long-standing cultural and economic ties; the connections with Campania also provided links with the Hellenistic world of southern Italy.[43] Roads between Rome and the Etruscan centres were established in the 3rd century BC, and the construction of the Via Flaminia provided the first corridor across the Apennines between the Tyrrhenian and Adriatic coasts. By the 2nd century BC major arteries had been extended towards the ports of southern Italy (Tarentum, Brundisium, Thurii and Rhegium), the Po Valley and the Alps. By the Imperial period additional long-distance routes had improved interregional contact, and minor roads now stimulated local and regional exchange.[44]

The structure and density of this network, however, differed between regions. The densely populated regions of Latium and Campania possessed elaborate road networks that enhanced opportunities for marketing. The radial network around Rome underlines the city's importance as a destination for travellers and products, but it also connected rural areas and smaller centres via a number of ports to regional and overseas markets and imported goods. In northern Italy a reasonably dense network complemented the fluvial transport routes of the Po river system.

In contrast, the major roads followed the coast in Etruria and southern Italy. While such a system enhanced trade between ports and other coastal towns, it did not stimulate the integration of interior areas. In the Apennine uplands the road network was not dense either; only areas along major roads could easily tap into the flow of goods that passed along these corridors. Interior northern Apulia, on the route between the Adriatic and Campania, and upland Picenum, with roads from the Adriatic coast to Latium and Rome, were well-connected, although the costs for goods to arrive there were relatively high.

The variable impact roads and rivers had on economic integration is also clear if we analyse the accessibility of infrastructural networks through cost surface analysis (Fig. 3.5). By early Imperial times, large parts of the Italian peninsula were within limited distance from navigable rivers or roads, and rural communities therefore had access to distant markets, albeit at variable costs. The Ligurian coast, northern Etruria, Apulia and parts of Calabria and Bruttium were less well accessible; the distance to infrastructural connections was considerable and must have limited economic integration of these scarcely populated parts of Italy.

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43 See also Olcese (this volume).

44 Quilici (1990, 12–17); Laurence (1999, 11–15).

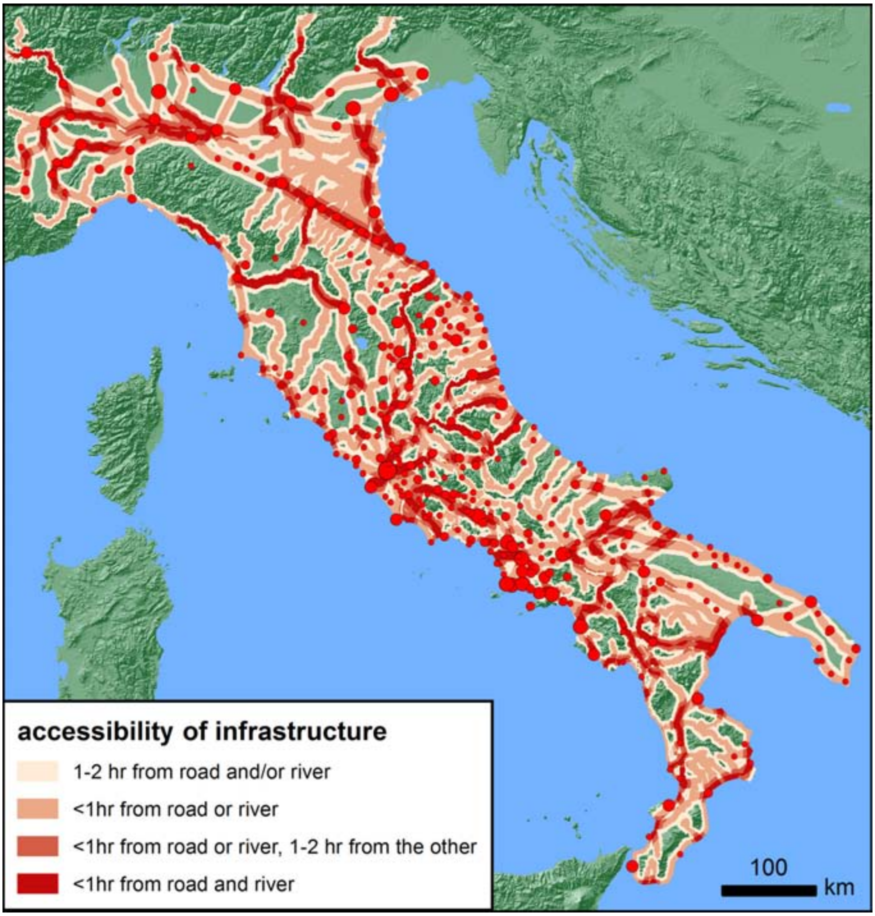

FIGURE 3.5 *Accessibility of major roads and navigable rivers*

Network Analysis enables us to formally analyse the structure of the road network in relation to the sites (nodes) it connects.[45] Here I use two network concepts: *betweenness centrality* and *clustering*.[46] Betweenness centrality is a measure of the amount of traffic or communication that passes through a site

45 Jenkins (2001); Isaksen (2008); Carreras and De Soto (2013); Brughmans (2013).

46 I have used Gephi 0.8.2 software (Bastian et al. 2009). The Barrington Atlas data I use includes almost a thousand sites and some 1200 routes between sites (Talbert 2000). Future work should ideally include the river network and maritime connections and incorporate gravity model factors such as distance and town size to refine the analysis and to analyse individual regional systems in more detail. Other network metrics, such as degree centrality, could also be applied in such analyses.

as it lies on connections between other pairs of sites. This type of centrality indicates how nodes, in this analysis the urban and minor centres of Roman Italy, influence, mediate or control communication and flows of goods between other nodes. It therefore reflects the importance of a site in trade and communication networks. Besides pointing out the importance of individual sites, high betweenness-centrality values also indicate the transportation routes that were probably used most intensively.[47]

Clustering on the other hand identifies subsets of nodes that, based on their connections, interacted primarily with each other and therefore represent regional clusters or subnetworks.[48] Together these two metrics allow us to identify potential economic regions or subsystems, the main routes that connected them as well as the sites that were the main contact points between different regional systems and therefore probable trade hubs.

Figure 3.6 presents both the 21 regional clusters (sets of coloured dots) and the 5% of sites with the highest betweenness scores (light to dark red squares). Many of the clusters are consistent with physiographic regions such as the Apulian plateau, the interior Po Valley and the Apennines of Samnium and Picenum. In these regions the road network primarily accommodated exchange within the region. However, the analysis also shows linear clusters of sites along major routes such as the Via Cassia and Via Flaminia north of Rome. The creation of these roads therefore altered pre-existing exchange networks and promoted integration between the central Tyrrhnenian coast, the Apennine uplands and the Adriatic. Equally, in areas such as northern Etruria and Liguria, the clusters traverse different landscape zones and suggest links between the northern Tyrrhenian coast, Apennine uplands and the Po Valley.[49] Whilst again at relatively high costs, the road network enhanced economic integration of different natural regions.

Furthermore the subdivision into clusters of the highly urbanized areas around Rome is significant: the road network favoured exchange between Rome towards the ports of Antium, Ostia and Portus and towards the interior to its north. These areas functioned as one well-integrated system focused on the city of Rome, a structure obviously enhanced by the River Tiber. Coastal Etruria, the Pontine region and the Sabina were relatively self-contained, although the former two were connected to wider trade networks via the ports of Centumcellae and Tarracina respectively.

47 This can also be analysed by calculating the betweenness of the edges, e.g. the road sections.

48 The clustering analysis used the 'Louvain method' algorithm.

49 See also Santoro (this volume) on the economic and cultural links.

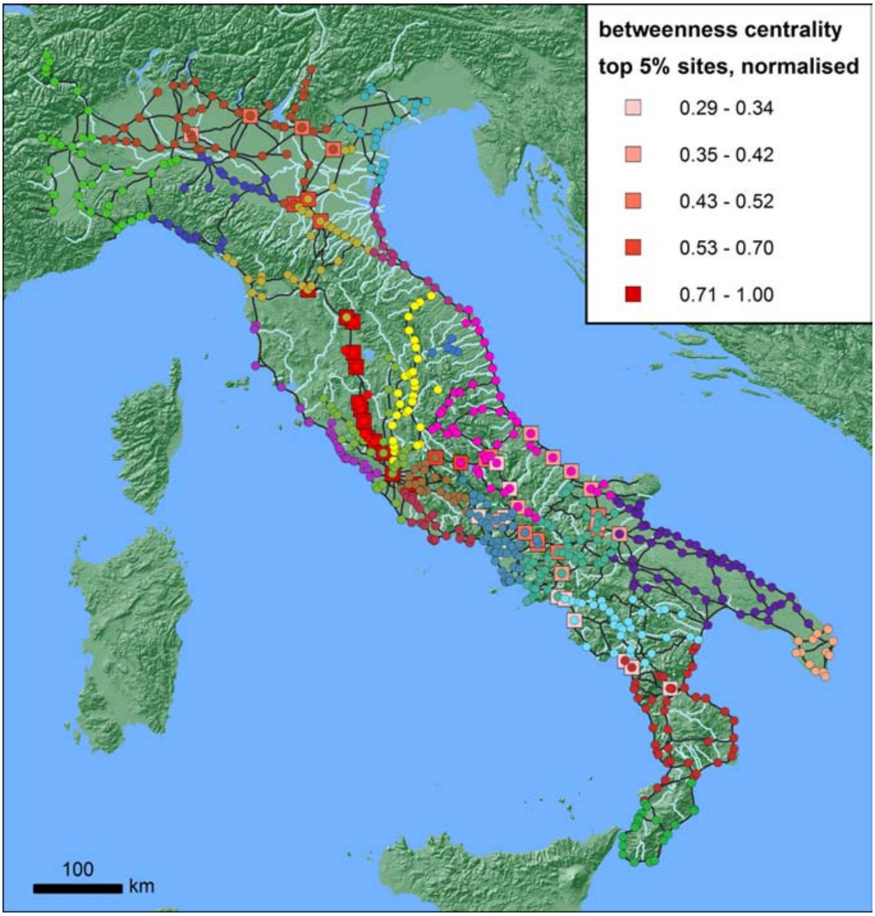

FIGURE 3.6 *Betweenness centrality (light to dark squares represent sites with increasingly high centrality values) and clustering (marked in different colours) of sites in Roman Italy*

In terms of betweenness centrality, Rome stands out with an exceptionally high score. This is not surprising, as Rome was the administrative and economic heart of the system and as such channelled communication and commercial flows. However, other sites have high scores too, which is indicative of their importance as hubs. Sites along the Via Cassia have particularly high betweenness centrality scores (all within the top 5 %) and benefitted from their position on this road, the primary connection between north and central Italy. Arretium is one such site, and its position on this route helps to explain the success of its ceramic industry: it was located on the edge of two regional clusters and close to a river that discharged in the Tyrrhenian Sea, and it could tap into different regional economic networks to market its products.

The analysis also points out probable hubs in exchange between the interior, middle and lower Po Valley: the sites of Bononia, Mutina, Vicus Serninus, Montagnana and Laus Pompeia, Brixia and Verona were most favourably situated to channel traffic within and between these areas. In central and southern Italy, sites such as Luceria, Aecae, Beneventum, Telesia, Alifae and Aeqinum also have high betweenness centrality scores and were situated on the edges of regional clusters. These hubs connected routes between south and central Italy with routes from the Tyrrhenian towards the Adriatic coast. The older Via Flaminia and Via Salaria were initially the main connections between Latium and the central Adriatic coast, but the high betweenness scores of Carseoli, Alba Fucens, and Corfinum suggest that the Via (Claudia) Valeria later on channelled much traffic as well.

Besides serving as central places, some minor centres also have high betweenness centrality scores suggestive of their role as hubs between rural areas and wider exchange networks. Their location on major routes and junctions allowed them to connect long-distance trade to local markets. In turn, they supplemented local demand with travellers' temporary need for goods and services. The surroundings of minor centres benefitted from economic integration and growth by engaging in specialized production for the export market and by the activities these hubs attracted: demand for additional goods and services could lead to so-called multiplier effects, providing opportunities for local economies through additional investment and spending in the local economy.[50]

5 Natural Resources and Agricultural Potential: The Geography of Rural Production

The uneven distribution of demand and the increasingly dense infrastructural network both had a profound impact on productive activities in rural areas, agricultural and non-agricultural.[51] Conversely, the development of such activities contributed to variable economic development and integration, as climatic, geological and geomorphological characteristics play a key role. Soil thickness and fertility, drainage conditions, slope angle and altitude provide

50 Dicken and Lloyd (1990, 222–226).

51 For recent work on agriculture, see Bowman and Wilson (2013) and Heinrich (this volume). On the non-agricultural economy, see also Peña (this volume) and Santoro (this volume).

varying conditions for crop cultivation;[52] raw materials such as stone and clay and specific floral and faunal resources are only available in certain environmental niches (e.g. wetlands, uplands, coastal areas).[53] Hence, physical geography provides variable potential for the development of agricultural strategies and non-agricultural activities and created a high degree of complementarity within and between regions (Fig. 3.7). To illustrate this, below I combine general observations on the physical geographic characteristics of Italy with archaeological observations on agricultural practices, in particular specialization and intensification, and non-agricultural activities, especially in central-Tyrrhenian Italy.

The Po Valley was one of the most fertile areas of the Italian Peninsula. It differed from other parts of Italy in that lower winter temperatures made olive cultivation impossible.[54] Cereals and grapes were the dominant crops; flax was presumably also important, and written sources refer to large-scale wool production, cattle and pig raising, timber extraction and pitch production.[55] Large parts of the Valley were drained and managed through extensive centuriations, which required technological knowledge, continued management and above all major investments, which suggest a highly commercial production system. As urban markets were large but widely spaced, we may expect belts of specialized agricultural production to have developed around these markets. The extensive river system, which was complemented by navigable canals and roads, allowed for cheap transport of the above-mentioned products to other regional urban markets and, via the Adriatic, to markets further away.[56]

The Apennine uplands were primarily suited for a mixture of cereal cultivation, particularly in the upland basins of the Central Apennines, and for pastoral strategies.[57] River valleys and plateaus could support specialized production of wine and oil, while steeper slopes and higher areas could not. Depending on the accessibility of transport routes, such production could target local, regional, or supra-regional markets. As the population potential of

52 Van Joolen (2003, 2).

53 Sallares (2008); Stoddart (2010).

54 For the limits of olive cultivation, see Horden and Purcell (2000, 14).

55 See also Heinrich (this volume) on regional differences in crop choices. White (1970, 67–68), pointing out millet as being particularly well-suited; see also Spurr (1986, 7–8) on cereal cultivation, and Sallares (2008) on the cultivation of high-quality bread wheat.

56 See White (1970, 67–68) on northern Italy as a major supplier of pork to Rome and on Aquileia as the intermediate node in interregional trade. See also Santoro (this volume).

57 Spurr (1986, 7–8); Barker and Grant (1991). See White (1970, 70–75) on products (wines, cheeses, fruits, wool, horses) different upland regions were known for.

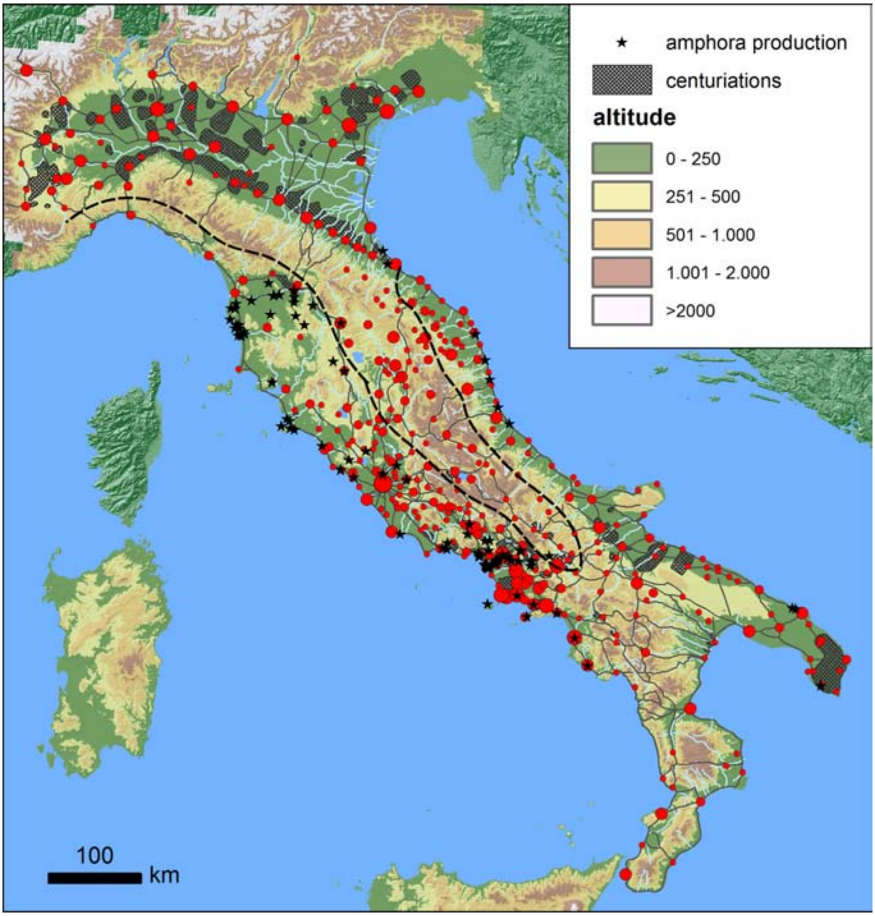

FIGURE 3.7 *Distribution of amphora production sites in Italy (the dashed line marks the presumed limits of olive cultivation; after Horden and Purcell (2000, 14))*

upland areas was moderate to low and transport costs between urban markets high, agricultural systems were probably ordered around individual markets according to the principles of the Isolated State Model (but adapted to the local landscape).[58]

Low population levels also provided opportunities for integration because of the availability of large stretches of land that could be used extensively, for large scale transhumance or breeding of cattle, sheep or horses. As animals could be transported to markets by foot and their products (wool, cheese,

58 See also Malone and Stoddart (1994, 189).

leather) were non-perishable, such forms of exploitation could profitably supply markets at greater distances. By keeping flocks in pens, manure could be collected, which facilitated intensification of agricultural production.[59] Integration also occurred through the extraction of other resources such as wood and stone, provided that cheap (downstream) river transport could be used. Such practices therefore imply stable relations and regular economic interaction between upland and lowland communities.[60]

The coastal plains of Etruria, Latium and Campania as well as those on the Ionian and Adriatic coast (including the Tavoliere) were suitable for the classical Mediterranean polyculture of grapes, olives and cereals.[61] There were also differences between and within these lowland zones: the volcanic soils of Campania were relatively fertile and productive, while the coastal plains of Latium and Etruria, although fertile, presented challenges in terms of drainage and diseases (e.g. malaria) and required intensive management to become productive.[62] These coastal zones included lagoons, less well-drained plains and hills where arable farming was complemented by other activities, such as hunting, fishing and/or fish farming, animal husbandry and cattle raising, salt production and forest exploitation.[63]

Variations in demand and connectivity also led to differences between these lowland areas. The extent and fertility of the coastal plains of Latium and Campania in combination with the large volume of demand in these areas favoured them as zones of agricultural intensification and specialization. This is visible in the zones of horticulture identified around Rome, which conform to the predictions of the Isolated State Model.[64] Similar belts probably existed around the large Campanian cities and, though less extensive, around cities throughout Tyrrhenian and Adriatic Italy. Manuring scatters recorded by field surveys provide evidence of such belts near urban markets and along major roads.[65]

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59 Stoddart (2010, 114) with references.

60 On transhumance, see Horden and Purcell (2000, 80–87); Barker and Grant (1991); Veenman (2002). On upland economies, see Giardina (1981) for southern Italy and Santoro (2007) for the northern Adriatic.

61 White (1970); Spurr (1986, 7–8); Stoddart (2010, 114); Sallares (2008, 27).

62 Sallares (2008, 21). See also White (1970, 68–73) and Spurr (1986) on cereals and forms of cereal cultivation.

63 On fish farming and salt extraction, see Marzano (2007, 47–56); on marsh exploitation, see Frassine (2013). On woodland exploitation, see also Veal (this volume). For intra-regional variations in land use potential, see Van Joolen (2003) and Goodchild (2007).

64 Carandini (1985b); Morley (1996); De Sena (2005); Wilson (2009a). On agricultural intensification, see Kron (2000, 2005 and 2008a).

65 De Haas (2012).

The distribution of amphora production workshops clearly illustrates the importance and extent of specialized production of olive oil and particularly wine, and the different geographic contexts in which it occurred (Fig. 3.7).[66] Such production facilities have been identified mainly in coastal areas, along the Tyrrhenian and central Adriatic coast and in Messapia, especially around Brundisium. These clusters of production sites reflect areas with favourable physiographical conditions for wine and olive oil production (and locations with good access to clay sources). Proximity to ports indicates the importance of export markets for these productions. However many amphora workshops have now also been identified in the interior parts of Tyrrhenian Italy, both in areas with a low population potential (northern Etruria) and in highly urbanized areas (Latium and Campania). Growing regional markets, especially in the latter areas, may have been an important stimulus to agricultural specialization; in northern Etruria, demand from markets further away stimulated the development of these remote areas.[67] In both cases, agricultural specialization is a clear reflection of the integration of inland areas into complex systems of production and trade.

With a growing population, demand for goods other than foodstuffs also increased. As I have argued, this increase in demand probably not only concerned basic goods (leather, wooden implements, metal work, textile, and ceramics), but also higher-value goods. It was met in different ways: by importing more of these goods, enlarging the production capacity of regional production facilities, and establishing new local production facilities.[68] To limit transportation costs, such production would occur close to the market, in proximity to transport infrastructure or, especially when both input and output are bulky, near sources of raw materials and fuel. Considering the overall volume of demand and the density of the infrastructural network, non-agricultural production could profitably develop in many rural areas.

The brick industry in the Tiber valley is one clear example of this.[69] Several geographic factors contributed to its expansion into a veritable industry: good-

66 Tchernia (1986, 45–56); Cipriano and Carré (1989); Olcese (2010; 2012).

67 See Olcese (this volume), Van Limbergen et al. (this volume) and Pasquinucci and Menchelli (this volume) for case studies. The amphorae suggest that the wine trade developed from the (late) 4th century BC onwards and continued into the 1st and, particularly in inland Etruria, the 2nd century AD.

68 See also Peña (this volume). On the non-agricultural economy, see also contributions in Mattingly and Salmon (2001a).

69 Graham (2006).

quality clays and ample fuel supplies were available, a dense network of roads and especially the river Tiber enabled cheap transport, and the city of Rome provided a booming market. Capital (of Roman elites) and labour were also amply available in this densely populated area. In addition, activities like quarrying and mining that relied on the presence of bulky raw materials, fuel and cheap transport, emerged in the Tiber valley and elsewhere.[70] The investments and labour force involved in these activities almost certainly led to an increase in the demand for goods and services around production facilities; such multiplier effects could stimulate local rural economies, particularly in periods of massive construction works.[71]

The distribution of pottery production sites in central Tyrrhenian Italy similarly illustrates the importance of non-agricultural activities for rural areas.[72] Pottery production was a common activity in the countryside: more than three-quarters of all known production sites were situated in rural areas (Fig. 3.8). Most of these production sites are situated around the main urban market, Rome, but they also occur around smaller cities or in close proximity to major roads, rivers and the coast. This suggests that pottery production in this densely populated region targeted local as well as regional markets that could profitably be reached via roads, rivers and the sea.

That diverse actors were involved in non-agricultural specialized production is also reflected in the contexts in which rural ceramic production took place (Table 3.1) and in the range of products attested. Production sites not only included elite estates, but also nucleated settlements and farms. This suggests that different modes and scales of production existed side by side; pottery production took place as part of villa/estate production, but also to complement or replace agricultural activities of freeborn peasants. Moreover, not only utilitarian wares, for which demand was highest, were produced in rural contexts, but also architectural materials, storage containers and higher-value table wares. The production of such diverse products also suggests that different consumers (households, rural estates, construction works) were targeted.

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70 On timber and charcoal, see Graham (2013). For paving, building and millstone production, see Black et al. (2008); McCallum (2010). At present we know much less about such industries in other parts of Italy (but see Santoro 2007). Specific resources (metal ores, marble) occurred elsewhere.

71 For Rome and the Tiber Valley, see Graham (2013).

72 Olcese (2012). This inventory no doubt only contains a fraction of the ceramic production sites in the region, as our recent work in the Pontine region also shows (Tol et al. (2014)).

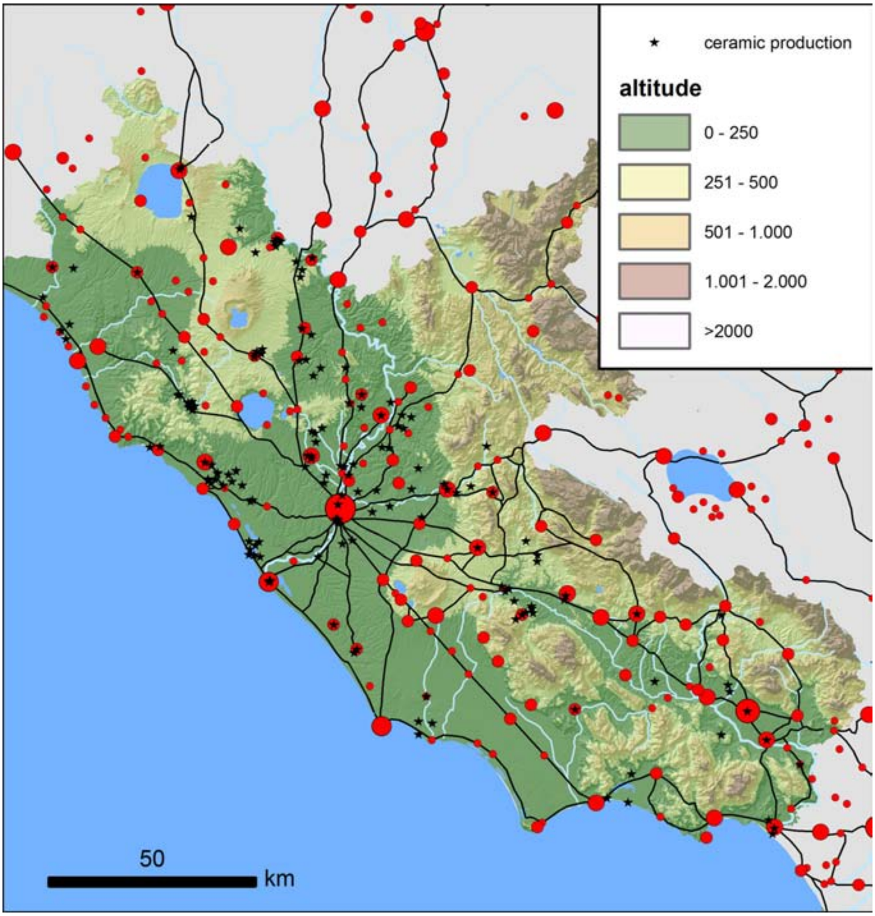

FIGURE 3.8 *Ceramic production sites in Lazio (data after Olcese (2012))*

The rise of rural ceramic production, and undoubtedly many other crafts that are archaeologically less well documented, contributed to the diversification of rural economies; trade in these products also promoted the economic integration of rural areas. While the two examples discussed here concern the most highly urbanized and well-connected (and best-studied) part of Italy, there is archaeological evidence that similar developments occurred in less densely populated areas. In such areas rural craft production often took place at well-connected minor centres, and in some cases not only targeted local or regional markets, but also took place as part of supra-regional exchange systems.[73]

73 See Vaccaro et al. (this volume) on a remote terra sigillata production site in Etruria.

TABLE 3.1 *Ceramic production sites in Lazio (data after Olcese (2012))*

Context	**N sites**
Urban	25
Rural	72
Farm	*11*
Farm/villa	*1*
Villa rustica	*8*
Villa	*39*
Mansio	*1*
Settlement	*12*
Other	24
Unknown	36
Total	157

6 Conclusion

In this chapter I have assessed the geographic characteristics of demand as well as the distribution, circulation and production processes and their role in the development and integration of rural economies in Roman Italy. This assessment, based on several synthetic datasets and the use of spatial analysis tools, leads to the following observations:

1) Urban demand was unevenly distributed. Central Tyrrhenian Italy and to a lesser extent the Po Valley and the Central Adriatic were areas with a high population potential. In other regions, urban demand was more limited and less regularly distributed, with local hotspots in areas of low population potential. Whilst surely more sizeable, the distribution of

Santoro (this volume) points out that in Friuli and Abruzzo minor centres provided semi-finished products to be exported and finished at markets at greater distances. For southern Italy, see Volpe and Turchiano (2005). Imperial estates may have had an important role in the organization of minor centres and associated productive activities (Small (2011)).

rural demand is less clear, but high rural population densities probably often correlated with areas with a large urban population.

2) In many areas urban markets were too far away to have served the needs of rural populations. Minor centers (*vici*, roadside settlements, rural sanctuaries and other nucleated settlements) probably functioned as market places, either on a temporary basis or permanently, in these areas. In highly urbanized areas (where rural population levels were also high), demand may have been so substantial as to stimulate the development of minor centres as secondary or tertiary market centres.
3) Both natural connections (rivers) and artificial infrastructure (roads, ports) favoured the integration of some areas, especially the highly urbanized areas of central Tyrrhenian Italy. They also favoured the integration of upland and lowland economies in central Tyrrhenian and Adriatic Italy. However, road and river networks were reasonably well accessible in most of the peninsula and allowed the integration of other areas, although at various costs and therefore probably also with a varying impact on rural communities.
4) Agricultural specialization (production of wine and olive oil, large scale animal husbandry) and intensification occurred not only near urban markets, but also in more remote areas. This development, especially in times of demographic growth and urban development, went hand in hand with a diversification of rural economies, with an increasing role for non-agricultural activities (e.g. pottery production, other crafts, resource extraction) and high degrees of integration at the regional and probably also the supra-regional level.

Thus, local demand, connections to more distant markets, and the productive potential of landscapes varied considerably within Italy. There were therefore also different regional and local patterns of agricultural practice and resource exploitation. These patterns follow the three principles discussed at the start of this chapter: physical geographical properties of the landscape conditioned patterns of agricultural specialization and resource exploitation; distance (costs) was the main factor in the allocation of different forms of land use around markets and in the distribution of cities and minor centres as central places; and concentrations of demand may indeed have led to agglomeration effects (as the scale and widespread occurrence of brick and pottery production in highly urbanized areas, especially around Rome, suggests).

Although, even if the potential for economic development and integration varied, diversified and specialized rural economies (of which both agricultural and non-agricultural production were part) arose throughout Roman Italy;

even in remote and thinly settled areas, rural communities were integrated into supra-regional economic systems. The development of infrastructural networks seems key in this development: it reduced the limitations posed by the friction of distance and allowed the potential of landscapes to be exploited more fully. Otherwise, we cannot explain the development of market-oriented wine and ceramic production in remote areas such as interior northern Etruria, large-scale cattle breeding in Apulia or the profitable importation of cheese from Liguria to Rome.[74]

Whilst regional variability and economic integration went hand in hand, this observation is a starting point for further research rather than a final conclusion: how profound was this integration of remote areas, and how did it change rural communities and lifeways?[75] A fuller assessment of different economic processes (including regulatory processes) in light of social change is certainly needed to answer such questions. But the geographic dimensions of these issues remain equally important, and a continued investment in the compilation of supra-regional datasets (for example of ceramic production sites to assess if crafts such as ceramic production indeed were common throughout Italy) should therefore be a clear priority for future research. The further development of methodologies to compare regional datasets is equally important, for example, to assess variable rural population densities and trends and to map patterns of differential access to imported goods.

Such future work will also crucially further our understanding of the dynamics of the geographic structure as outlined here. While it seems that technological developments and investments in road building, port construction and centuriation changed the accessibility and agricultural potential of regions, we do not yet know how this affected economic development at the macro scale.[76] Additionally, how the geography of different economic processes changed over time will play a key role in understanding the interplay between population growth and infrastructural and technological developments.[77] Finally, the role of Rome and the expanding Roman territories outside Italy should also be assessed.

To this end, the general observations made here should be tested through comparative analyses of regions that represent areas with different geographic,

74 For this (anecdotal) example see White (1970, 69).

75 See also Witcher (this volume).

76 See De Haas et al. (2011) and Tol (this volume) for a case study.

77 See also Witcher (this volume) on the difficulties of establishing causality between infrastructural investments and economic growth.

demographic and infrastructural potential. Regional archaeological data certainly hold the key to a better understanding of how population growth, infrastructure and systems of production contributed to the economic development and integration of Roman Italy.

Acknowledgements

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PART 2

Arable Production and Society

CHAPTER 4

Something Old, Something New: Social and Economic Developments in the Countryside of Roman Italy between Republic and Empire

*Alessandro Launaro**

1 Introduction

In his classic publication *Hannibal's Legacy*, Toynbee wrote about the economic consequences of the deracination of the Italian peasantry which supposedly had both accompanied and followed the Hannibalic War. In his opinion new economic possibilities had potentially existed in the Italian peninsula since its political unification, though they had never really been exploited: "*If an alternative economic system, or set of systems, were to present itself, and if the introduction of this promised to be profitable to the old Roman aristocracy or to the new commercial and industrial class whose fortunes had been made by the wars that had been the Italian peasantry's ruin, this ruined and uprooted peasantry would no longer have the strength to protect and preserve its ancestral way of life*".[1] Whatever the exact nature of the relationship Toynbee established between the outcome of the Second Punic War, rural free-population dynamics, the attitude of the landed aristocracy, and new productive/trade patterns, the interplay of these factors has kept many scholars occupied over the last fifty years.[2] The aim of this chapter is to offer a critical discussion of more recent developments in our understanding of the social and economic transformations taking place within the countryside of Roman Italy in the period 200 BC to AD 100.

* This chapter presents results from wider research that has been generously funded as a British Academy Postdoctoral Fellowship (2009–2012) and a Leverhulme Early Career Fellowship (2012–2013) held at the Faculty of Classics, University of Cambridge.

1 Toynbee (1965, 105).

2 The relevant bibliography is indeed endless. Seminal work includes: Rostovtzeff (1957, 15–29); Toynbee (1965); Brunt (1971b); Hopkins (1978a); Garnsey (1980); Rathbone (1981); Giardina and Schiavone (1981); De Neeve (1984); Potter (1987, 94–124). For more recent contributions and the current state of the debate: Marzano (2007); De Ligt and Northwood (2008a); Carlsen and Lo Cascio (2009).

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2 Demographic Patterns

Population is one aspect of the debate that has received increasing coverage over the last two decades, and even more so over the last few years.[3] This is hardly surprising, considering the crucial role of population size in relation to the structure and (economic) performance of any civilization.[4] Whereas Toynbee originally emphasized the material destruction and heavy human losses caused in Italy by Hannibal's invasion, Brunt was more inclined to explain decline as the dire demographic effects of the prolonged military mobilization of the Italian peasantry at the time of Mediterranean conquest.[5] All these claims were held to have found close correspondence in the series of extant Roman census figures: the Italian population was assumed to have declined from c. 4.5 million in 225 BC to c. 4 million in 28 BC, in a pattern that extended well into the 1st century AD.[6] Given that both documentary and archaeological evidence point at increasing levels of urbanization in the course of the same period, if there had indeed been a decline of the Italian free population it would have been the decline of its rural component. However, relevant comparative evidence shows that pre-industrial urban populations (i.e. consumers of agricultural produce) have always required a proportionally larger rural counterpart (i.e. producers of agricultural produce) to support them, usually amounting to at least 80–90% of the total population.[7] And that is precisely why masses of slaves had been brought to Italy—to replace missing peasants.

Recent studies of the population dynamics of Roman Italy have all contributed to a profound revision of this view. Although there is still no agreement about the interpretation of census numbers and actual population levels in early Imperial Italy, the most recent estimates tend to propose slightly to considerably higher figures than before. What is really remarkable, however, is the fact that current reconstructions all seem to agree that the slave population was rather smaller than originally assumed (i.e. well below 2 million individuals in both town and countryside); and that the Italian free population as a whole in fact increased between 225 and 28 BC (Table 4.1). However, a closer look at De

3 Lo Cascio (1994a and b; 1999b); Scheidel (2004; 2005); Launaro (2011a); De Ligt (2012a); Hin (2013).

4 Scheidel (2007a). Notions of structure and performance in the economic history of the Greek and Roman World: Morris et al. (2007, 1–2).

5 Brunt (1971b, 131–155 and 269–277).

6 Hopkins (1978a, 68: Table 1.2), based on estimates by Brunt (1971b, 121–130).

7 Bairoch (1989, 247).

TABLE 4.1 *Some of the more recent demographic estimates for Roman Italy (in millions)*

Interpretation	225 BC	28 BC		References
	Free	Free	Slave	
Low count	3.9	4.2	1.5	De Ligt (2012, 190 Table 4.3)
Middle count	4.95	6.7	1.5	Hin (2013, 293–295 Table 7.3)
High count	7	12	1.8	Lo Cascio (1994a, 115); Lo Cascio, Malanima (2005, 203–204); also Launaro (2011b, 16–18 Table 1.1)

Ligt's reconstruction shows that his lower estimates would still imply a significant decline in terms of the rural free population (from 3.5 million in 225 BC to 3.1 million in 28 BC).[8] Only mid-range or higher figures can in fact accommodate both urban expansion and some—more or less marked—free rural population growth.[9]

This rural growth finds some striking confirmation in my own analysis of rural settlement patterns—as evidenced by field survey data—from all over Italy between the late Republican (200 to 50 BC) and early Imperial periods (50 BC to AD 100). Indeed, except for the 'usual suspects' (i.e. central/coastal Etruria and the south-east), evidence for the rural free population (in the form of the combined number of farms and villages) points to patterns of a general increase all over the Italian Peninsula (Figs. 4.1 and 4.2).[10] But when did this increase actually take place? The nature of the evidence does not allow us to pinpoint these transformations exactly. In light of the nature of the demographic debate, I still believe that the most economical interpretation of this trend is to assume the relevant transformations to have originated in the late Republic, only to fully develop in the course of the early Empire.[11] This

8 De Ligt (2012, 190 Table 4.3).

9 Launaro (2011a, 184–188); Hin (2013, 340).

10 Launaro (2011a, 149–164).

11 Launaro (2011a, 166). Given the confusion it has clearly created among some readers (Hin 2013, 335–341; Scheidel 2013, 685–686), it is clear that this claim would benefit from a far more extensive and detailed discussion than would be appropriate here. As far as this contribution is concerned, let it suffice to say that the figures produced by me for each period should not be understood as peaks of maximum occupation in their respective closing years (i.e. 50 BC and AD 100), but rather as indicators of an on average 150-year-

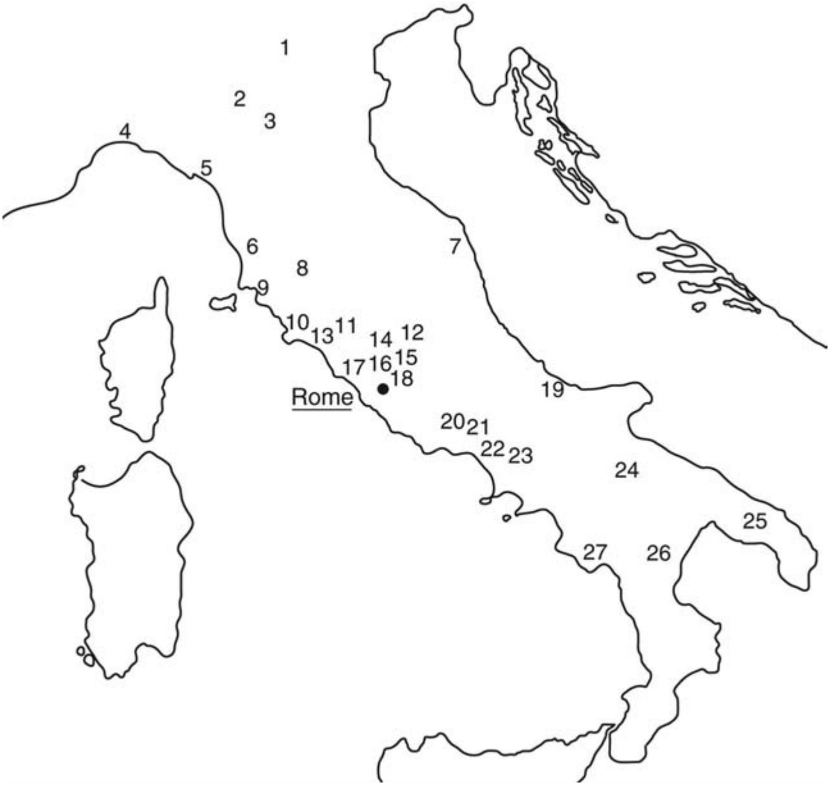

FIGURE 4.1 *Location and list of survey projects (reproduced from Launaro (2011a, 104 Fig. 5.1)). 1: Valli Grandi Veronesi; 2: Carta Archeologica del Comune di Poviglio; 3: Carta Archeologica del Comune di Modena; 4: Polcevera Valley; 5: Ager Lunensis; 6: Cecina Valley; 7: Potenza Valley; 8: Carta Archeologica della Provincia di Siena; 9: Scarlino; 10: Albegna Valley; 11: Tuscania; 12: Rieti Basin; 13: Marina di Montalto; 14: Ager Foronovanus; 15: Corese Survey; 16: Torrimpietra; 17: Ager Caeretanus; 18: Collatia; 19: Biferno Valley; 20: Fregellae; 21: Liri Valley; 22: Northern Campania; 23: Carta Archeologica della Campania; 24: Ager Venusinus; 25: Oria; 26: Carta Archeologica della Valle del Sinni; 27: Roccagloriosa.*

is because traditional narratives of late Republican rural decline imply that the rural population had not recovered to late 3rd century BC levels even by AD 47, making it very difficult to believe that the entire increase in farms and villages occurred within precisely those fifty years (AD 50–100) which witnessed

long, approximate condition throughout, and as attempts to create a general impression of the relative variation in settlement patterns throughout the two periods.

FIGURE 4.2 *Overall trends for the rural free population of Roman Italy (200 BC to AD 100) (after Launaro (2011a, 161, Fig. 6.4))*

destruction inflicted upon Italy both by war (AD 69, for the first time after a century of peace) and by dramatic natural events (the eruption of Vesuvius in AD 79, resulting in the obliteration of one of the richest agricultural areas in the Italian peninsula).[12]

Of course, it is certainly possible that even significant transformations in the short term have been lost within each of the above-mentioned 150-year periods.[13] Nonetheless, even assuming that some decline in the rural free population did take place in the course of the late Republican period, there are no

12 Launaro (2011a, 47–49 and 163).

13 E.g. compare the three short-term 'crises' identified in the Tiber Valley: Patterson et al. (2004).

indications to suggest that this triggered any serious Italian crisis in the long term (i.e. between 200 BC and AD 100). It is for these reasons that one has to appreciate De Ligt's recent efforts to further revise his own original low figures in order to accommodate overall population growth and to reduce the scale of rural decline. However, although such revised figures would make it possible to interpret growth as a phenomenon belonging exclusively to the 1st century AD, it is the interpretation of the textual evidence which appears unwarranted and—ultimately—unconvincing (especially with respect to the Polybian figures for the late 3rd century BC).[14]

Whatever the case may be, it is clear that the idea of a long-term decline of the Italian peasantry does not hold up against current views. More to the point, Rosenstein has since convincingly drawn attention to the rather striking relationship between the structure of the Roman family and military mobilization patterns. Within a fundamentally agrarian society plagued by seasonal underemployment and partible inheritance, the prospects of military service were in all likelihood rather welcome, since war provided a significant share of the population—Roman citizens as well as Italian allies—with concrete opportunities for personal advancement.[15]

3 Villas and the Free Rural Population

If military mobilization did not create the conditions for the decline of the free peasantry and its replacement by slaves, what should we make of the increase in larger estates which ancient authors have placed so much emphasis on and for which there seems to be concrete archaeological evidence in the form of the spread of villas? Was not the aristocracy doing its best to acquire land from smallholders, thus eventually driving them out of the countryside while at the same time adopting a 'slave mode of production'? Throughout my original dataset of Italian surveys, the number of villas and the free rural population seem to have increased together in the vast majority of cases. Elsewhere I have therefore argued for their being closely linked as part of the same process of (moderate) economic growth, with tenancy providing a much preferred and widespread solution among the landowning elite.[16]

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14 Launaro (2011a, 41–43 and 2013, 526); Hin (2008, 191–201).

15 Rosenstein (2004, 63–106).

16 Launaro (2011b, 20–26; 2011a, 166–177; 2015). In contrast with villas, farms and villages have traditionally been associated with free residents.

Nonetheless, there remains an important issue to be addressed. My original analysis was tailored to a broadly demographic question and therefore aimed at quantifying the relevant trends of farms, villages and villas across each individual survey project taken as a whole. As such, it did not need to account for the actual location and relative position of the different categories of sites, since this level of information—though valuable in itself—had only limited relevance to aggregate trends. However, more is needed if one wishes to argue for the close relationship between villas and the rural free population. Indeed, what appears to be a close relationship of mutual growth at the aggregate level, may actually have concealed radically different local situations in which the number of villas increased in areas where the rural population was either absent or declining (e.g. villas supplanting farms in core areas and pushing a growing peasantry towards more marginal lands).

In order better to understand the above relationship due attention must be given to underlying spatial patterns. This leads to the following question: within each survey area, what is the difference (if any) in terms of rural free-population trends (i.e. farms and villages) measured a) in the immediate neighbourhood of villas and b) in the rest of the landscape? Similar patterns in both zones may indicate that villas had no sensible impact, whereas a marked difference would point in a different direction.

The Spatial Dataset

The first step towards answering this question is defining the spatial dataset. For the sake of compatibility with my earlier research the same chronological framework (late Republic/*LR*: 200 to 50 BC and early Empire/*EE*: 50 BC to AD 100) as well as the same quantification and calibration procedures were followed (the latter explaining the decimal values).[17] Although an attempt was made to include all the original twenty-seven survey projects, not all of them contained suitable spatial information, and the current dataset is therefore limited to nineteen cases (Appendix 1).[18]

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17 Launaro (2011a, 93–97).

18 The following were not included (north to south): the Polcevera valley (no villas attested), Ager Lunensis (only one villa attested, unsuitable map), Cecina Valley (unsuitable map), Tuscania (still unpublished, no maps or gazetteer available), Marina di Montalto (unsuitable map), Fregellae (only one villa attested, unsuitable map), Oria (no villa attested) and Roccagloriosa (unsuitable coordinate format). Some overall figures in Appendix 1 are different from those originally presented in Launaro (2011a, 150: Table 6.1). Some of the totals appear to be lower, due to the fact that in some cases—including some otherwise impeccable publications—it was not possible to locate all sites. On the other hand, higher totals

Before proceeding it is important to address a concern recently voiced by Hin, i.e. that this type of analysis is only reliable if it is limited to survey projects which cover an area sufficiently large to account for internal environmental variation. This concern was prompted by the apparent correlation Hin observed within most projects and across the entire dataset between the number of identified late Republican farms and their increase into the early Imperial period: the lower the former, the higher the latter. This pattern was assumed to cast serious doubt on the statistical validity of derived trends, and it was therefore suggested that only six (out of twenty-seven) projects ought to have been included, incidentally rendering overall growth patterns significantly less pronounced.[19] There is certainly some merit in these observations, but upon closer scrutiny a fallacy or at least a serious misunderstanding is revealed in Hin's claims. While fully agreeing with her overall argument, Scheidel observed: "*the problem with this approach is that it cannot account for the fact that the presumed error in small samples is unidirectional instead of random*." In other words: why do initially low numbers of late Republican farms never decline but instead always increase substantially?[20]

In a scenario of significant rural population growth (as outlined above), it seems reasonable to assume that the same areas that had experienced more limited settlement in the late Republican period would witness more intensive growth into the following period, as they could absorb a more sustained demographic increase. The above-mentioned interpretive fallacy is then to have equalled the number of republican farms with the overall size of the survey (a confusion which appears most evident in Scheidel).[21] But even if a correlation existed between survey area and observed increase, one would have to explain not only why such trends are so unidirectional, but also why we should discount the possibility that such generalized growth had actually happened (i.e. besides the fact that this would defy expectations among supporters of low or middling demographic scenarios). As always, the value of statistics is that it allows us to see patterns, but the subsequent interpretation—in this

are associated with the *Carta Archeologica della Provincia di Siena* and the *Carta Archeologica della Campania*, where later issues were included: Botarelli (2004); Felici (2004); Cenni (2007); Paolucci (2007); Quilici and Quilici Gigli (2010).

19 Hin (2013, 308–317, especially Figure 8.3, Tables 8.4–5).

20 Scheidel (2013, 683).

21 Scheidel (2013, 683): "Launaro's assumptions [...] are challenged by her [i.e. Hin's] observation of a strong and statistically highly significant correlation between *sample size* (*i.e., the number of sites reported in a given survey*) and growth rates between LR and EE: the smaller the *samples*, the greater the increase tends to be." (my italics).

case archaeological—of those patterns rests with us. Besides, a reduction in the number of case-studies will lead to a less representative view of environmental variation across Italy as a whole.[22] Real progress can only be expected by including more (new) survey projects and their data as generated by new waves of landscape archaeology.

Going back to our dataset, as one would expect, the degree of accuracy by which the individual sites were georeferenced varied across the different projects, but on average it seems to have been in the order of 50 m—sometimes even less. All such sites have been entered into a GIS and the following proximity analysis has taken place within each survey area:

1. A buffer zone around each villa was created with a notional distance-radius of 1,000 m, labelled N_{1000} (N for nearer). The area outside this buffer was labelled F_{1000} (F for further), such that $S = N_{1000} + F_{1000}$, where S refers to the complete survey area.[23]
2. Within each zone (N_{1000}, F_{1000}), the number of farms and villages in the *LR* and *EE* periods was established, thereby establishing the trend (expressed as a percentage).
3. Within each zone (N_{1000}, F_{1000}), farm and village trends were combined (Table 4.2) to obtain an impression of the underlying rural free-population pattern (i.e. 'RFP Trend'), expressed as + (increase), = (stable), or – (decline).[24] The processed data were plotted on a map of Roman Italy (Fig. 4.3).

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22 Launaro (2011a, 103). Many more projects were omitted from the original study because they did not meet the criteria for inclusion (i.e. shared chronological framework, comparable site classification, and adoption of the *site* as the basic unit of analysis): Launaro (2011a, 85–88 and 143–145).

23 Of course, the exercise assumes a simplified isotropic space and does not take into account topography or other important natural or human features (e.g. rivers, roads) that may have affected actual travel distances. In fact, the adopted distance radius is meant to convey a global impression of 'immediate' neighbourhood. N_{1000} would in fact amount to c. 314 ha (or c. 1250 *iugera*), a fairly sizable estate, which would have exceeded twice the limit (500 *iugera*) which Tiberius Graccus had tried to impose on individual land ownership (App. *BC* 1.11).

24 Launaro (2011a, 98–100). Farms and villages could be combined in three ways: a) If both groups had declined (≤ –10 %), remained stable (> –10 % and < +10 %) or increased (≥ +10 %), it was assumed that the underlying rural free population had also respectively declined, remained stable or increased; b) If one group had remained stable while the other had declined or increased, it was assumed that the underlying rural free population

FIGURE 4.3 *Overall trends for the rural free population of Roman Italy for* N_{1000} (*left*) *and* F_{1000} (*right*) *as centred on villas*

Unity through Diversity

Before commenting on the dataset it should be emphasized that only two of the nineteen projects that were considered did not reveal a growth in the number of villas between *LR* and *EE*.[25] Having said this, an inventory of all cases of decline, stability and growth within N_{1000} and F_{1000} reveals that in about 84% (32/38) of the study areas the rural free population did not decline in either of these zones.[26] This does not mean that each individual survey showed the same trend in its *nearer* and *further* zones. Indeed, some interesting patterns in rural population trends become visible. With the exception of two cases where the

had also respectively declined or increased; c) If one group had declined while the other increased, it was assumed that the underlying rural free population had remained more or less stable.

25 Both the *Carta Archeologica della Campania* and the *Carta Archeologica della Valle del Sinni* suggest that the number of villas remained stable.

26 In view of the rather uneven distribution of sites between N_{1000} and F_{1000} in the Valli Grandi Veronesi, Ager Foronovanus, Corese Survey and Northern Campania, caution is required when interpreting the resulting patterns. Having said that, it is rather interesting that they so closely match the more general trends observed throughout the dataset.

survey area fell completely within the N_{1000} zone,[27] most areas (11) experienced the same overall trends in both N_{1000} and F_{1000}.[28] Prominent among these is the Albegna Valley: although the presence of villas there had a distinctly negative impact on nearby farms (−20%), this was clearly not the case further away (−2%). The opposite is true for villages, as they proved much more resilient when near villas (+9%) than at a greater distance (−19%). Such contrasting patterns are unlikely to have cancelled each other out towards preserving population levels in the Albegna Valley, but this appears to have in fact being the case in the Biferno Valley: not only did the growth of the villages probably offset an associated decline in farms, but the former is highest (+150%) where the latter is most pronounced (−31%). The presence of villas may therefore have triggered a more general transformation of the landscape, specifically a trend away from a dispersed towards a nucleated settlement pattern, with no actual fluctuations in the number of people involved.[29]

With respect to the latter phenomenon, the case of the *Carta Archeologica della Provincia di Siena* is especially intriguing. If the decline in farms seems unrelated to the presence of nearby villas (i.e. −17% in N_{1000} and −21% in F_{1000}), the decrease in villages is far more significant (i.e. −53% and −28% respectively). To put this data into perspective they should be viewed in the context of other important local developments. Particularly relevant, in addition to the more general proscriptions/expropriations enforced by Sulla in Etruria, is the foundation of the colony of Saena Iulia sometime in the second part of the 1st century BC.[30] This event involved the creation of an urban settlement in an area until then mostly untouched by urbanization. It seems likely that the declining number of farms and (especially) villages was a direct effect of the establishment of this new centre of gravity. The very few villas, rather than being a cause, were themselves a result of the very same process of landscape transformation.

As for the remaining six survey projects, they reveal some interesting differences between the *nearer* and *further* zones. In three cases the rural free pop-

27 i.e. the Corese Survey and Collatia, both showing overall growth in the rural free population.

28 Decline: *Carta Archeologica della Provincia di Siena*, Albegna valley and Ager Venusinus. Stability: Scarlino and Biferno valley. Growth: *Carta Archeologica del Comune di Poviglio*, *Carta Archeologica del Comune di Modena*, Potenza valley, Ager Foronovanus, Torrimpietra and Ager Caeretanus.

29 Launaro (2011a, 130 and 155).

30 Harris (1971, 251–267 on initiatives carried out by Sulla in Etruria; 303 and 310 on *Saena Iulia*).

ulation remained stable near villas but increased further away while, remarkably, the opposite seems to have happened in the other three areas.[31] Here the village distribution pattern seems to point to much more nuanced transformations than mere fluctuations in numbers; the ratios *nearer to/further from* villas varies considerably between survey areas.[32] In summary, this short overview can only emphasise the diversity of the situations encountered in different areas of Italy during a period when many of them experienced the maximum presence of villas in their own landscapes.[33] Although this presence took many different forms and generated many different outcomes, the disparate evidence needs to be combined into a consistent picture so that specific patterns can be identified and explained in relation to each other. What is needed is an 'open model' for the villa economy of Roman Italy.

4 Profit and (Land-)Ownership Patterns

One obvious general trend in the original dataset of twenty-seven surveys is the growing presence of villas across Italy, a trend which is likely to have originated in the late Republic and reached its maximum in the early Empire (see above). Although the diversity of the individual situations does not warrant a straightforward and uniform explanation, it is nonetheless a fact that villas tend to be predominantly—if implicitly—associated with commercial agriculture (i.e. surplus, market-oriented production of wine, oil and wheat) and slave labour. These two aspects are closely linked, as they are both associated with what is widely considered to be the basis of the villa economy: its profitability. In recent years, however, Rosenstein has come to question this latter assumption on the basis of guesstimates of the probable total annual consumption of wine, oil and wheat these enterprises supposedly had to cater to.[34] Rosenstein obtained these estimates by combining the number of potential consumers with average per capita consumption levels. Having arrived at this grand total he then took into account the agricultural area required to produce it and the total gross profit (in sesterces/HS) that it could have raised on the market. Although

31 N_{1000} stability/F_{1000} growth: Valli Grandi Veronesi, Rieti basin and *Carta Archeologica della Campania*; N_{1000} growth/F_{1000} stability: Liri Valley, Northern Campania and *Carta Archeologica della Valle del Sinni*.

32 E.g. contrast patterns from Northern Campania and the *Carta Archeologica della Campania*.

33 A diversity already acknowledged (for Etruria) by Witcher (2006a).

34 Rosenstein (2008 and 2009).

the resulting figures are in themselves impressive, once they are apportioned among the likely number of producers involved, the average share in the profit appears unexpectedly modest. It seems unlikely that the prospect of such limited profits could "*have led many aristocrats to pour money into land, displacing legions of smallholders*", especially given that "*money-lending and urban enterprises offered more enticing business opportunities*".[35]

Much of Rosenstein's argument rests on a series of heuristic assumptions, the value of which is rather questionable.[36] Particularly troubling in the argument, however, is the handling of prices. Leaving aside for the moment the question of the reliability or representativeness of the available data, the figures used by Rosenstein are low or very low when contrasted with evidence derived from urban contexts (Pompeii, Herculaneum and Rome).[37] This observation seems all the more compelling when one considers that—as Rosenstein himself states—demand was basically limited to the urban population of Roman Italy, including Rome itself.[38] In addition, an ability to sell when prices are right is a quintessential mark of 'commercial' agriculture.[39] Wealthier landlords

35 Rosenstein (2008, 24).

36 I feel reluctant to generalise the figures mentioned by Cicero in his *Paradox of the Stoics* (49) to gain an impression of the likely income a 'rich' or 'very rich' Roman derived from his landed properties. Cicero's point about the nature of true wealth was a philosophical one, not a precise assessment of his or anyone else's income. Even if Cicero's assessment was realistic, he may be assumed to refer rather to *gross* income, in line with a practice later attested in Columella (3.3.8–10); see Duncan Jones (1982, 33–59).

37 Rosenstein (2008, 14): wine at 8.5–15 HS per amphora; wheat at 2–4 HS per modius. However, only one of the wine prices (per amphora) known from Pompeii (12, 24 and 48 HS), Herculaneum (24, 36, 48 and 54 HS) and Rome (61–88 HS) is less than 15 HS. Lower figures (8 HS) are attested in Nomentum and Aesernia, but the former refers to the sale of grapes still on the plant (i.e. not processed wine) whilst the latter may be apocryphal (Duncan-Jones (1982, 46–47 and 364–365). Far higher prices could have been obtained overseas, as Diodorus' anecdotal reference to wine sale in Gaul seems to suggest (Diod. Sic. 5.26.3). The same can be argued for wheat. Duncan-Jones estimated retail prices in Rome to be c. 6 HS per modius, that is 50 % higher than the maximum Rosenstein allowed for. Note also that "*a controlled price of HS 4 per modius* [...] *may be representative of normal conditions in Italy*". Far higher prices of 12–20 HS per modius could be obtained by selling processed flour: Duncan Jones (1982, 346 on Rome, and 50 on normal conditions in Italy).

38 Rosenstein (2008, 3 and 11).

39 E.g. Cato *Agr.* 2.7.; Var. *R.* 1.22.4. In practice, this was made possible by suitable storage facilities (situated in the *pars fructuria* of a villa) where the produce could be kept for a while, a feature particularly important in connection with the aging of wine (Tchernia 1986, 114–115). Wealthier landlords could certainly afford the additional costs involved in selling not only *when*, but also *where* the price was higher (e.g. Rome and the other Italian

could have also claimed a larger—and wealthier?—segment of the market than that arbitrarily selected by Rosenstein, at the same time deriving a higher gross income per unit of produce than their less affluent competitors. Since prices moreover varied considerably (in fact, little is known about them), the question of how the market was apportioned among producers becomes even more difficult to answer (if relevant at all), especially in view of the real possibility that high profits were a result of precisely such variability.

In short, nothing in Rosenstein's parametric model precludes the possibility that senators may have raised considerable profits from commercial farming in the late Republic.[40] However, one set of implications deriving from his overall argument is particularly compelling, as well as greatly indebted to an earlier analysis by Jongman.[41] Leaving aside the profitability of commercial agriculture, it is in fact possible to estimate how much land would be required to meet the maximum levels of demand for wine, oil and wheat. What follows is a slightly adapted version of some of Rosenstein's calculations for the 1st century BC (Table 4.2).

First, let us assume 2.7 million to have been the size of the urban free population of Italy excluding Rome, the highest figure proposed so far. The city of Rome itself (800,000 inhabitants) only shared in the wine and olive oil consumption, since "*most if not all of Rome's needs were met by grain from Sicilian, North African, and other overseas producers*".[42] Also to be included are the Roman military forces (100,000), whose grain, however, "*came principally from tributum paid by the Republic's provinces as well as contributions from allies, and not from purchase from Italy's farmers*".[43] For the sake of argument, let us assume that average consumption levels among those 3.6 million free people were high, resulting in an overall demand figure of c. 576 million litres of wine,

towns, overseas markets). Rosenstein (2008, 14 with reference to Morley (1996, 160–166, and 2000); Paterson (1998, 158–163)) states that "*producers preferred either to sell their crops 'at the farm gate' or at least to transport them to middlemen in the cities rather than market their crops themselves*", implying considerably lower returns (i.e. wholesale prices). But this specific assumption—however attractive—is unsuitable for a parametric model which tests the potential profitability of commercial agriculture. Indeed, if profit maximization was the goal, wealthier landlords were in a position to afford the risks involved in direct marketing (perhaps through *institores*: see Aubert (1994)) in order to sell at higher retail prices.

40 *Pace* Rosenstein (2008, 23–24).

41 Jongman (2003, 112–116).

42 Rosenstein (2009, 251).

43 Rosenstein (2008, 17).

TABLE 4.2 *An extreme (and unrealistic) scenario: the relationship between the highest levels of demand proposed so far and an agricultural system entirely and exclusively based on the exploitation of rural slave labour (* the area required for olive cultivation is not included in the total figure: see main text)*

Product	Per capita annual consumption	Consumers	Consumption	Average yield per ha	Area required (ha)	Required number of slaves
URBAN FREE (including exports)						
Wine (l)	160	3,600,000	576,000,000	2,000	288,000	164,160
Exported wine (l)			75,150,000	2,000	37,575	21,418
Oil (l)	30	3,600,000	108,000,000	440	245,455	53,264
Wheat (kg)	266	2,700,000	718,200,000	400	1,795,500	287,280
URBAN SLAVES						
Wine (l)	100	1,000,000	100,000,000	2,000	50,000	28,500
Oil (l)	20	1,000,000	20,000,000	440	45,455	9,864
Wheat (kg)	200	1,000,000	200,000,000	400	500,000	80,000
RURAL SLAVES						
Wine (l)	100	850,000	85,000,000	2,000	42,500	24,225
Oil (l)	20	850,000	17,000,000	440	38,636	8,384
Wheat (kg)	200	850,000	170,000,000	400	425,000	68,000
TOTAL					**3,138,575***	**745,095**

108 million litres of oil and 718.2 million kg of wheat.[44] These figures, however, do not account for the overseas export of wine. Tentative estimates available for Gaul are based on the number of known shipwrecks from southern France that were carrying late Republican Dressel 1 amphorae as reckoned by Tchernia. The scale of Italian exports across the rest of the Mediterranean should not be

44 Annual per capita consumption levels: 160 litres of wine (× 3.6 million), 30 litres of oil (× 3.6 million) and 266 kg of wheat (× 2.7 million). See Rosenstein (2008, 4–5).

underestimated, so that it is paramount to account for all known shipwrecks with a cargo of Italian late Republican amphorae (Dressel 1 and Lamboglia 2 types). Extrapolating from shipwreck numbers is difficult, but if Tchernia's own parameters are used the number of relevant shipwrecks suggests the volume of exported wine to have been c. 75.15 million litres.[45]

However, the urban population also included slaves. Scheidel's inductive calculations arrived at a maximum of 440,000 slaves in Rome and 560,000 in the other Italian cities, resulting in a total of 1 million urban slaves.[46] Although some urban slaves enjoyed higher living standards than many of the free inhabitants, average consumption levels among slaves may safely be assumed to have been below those of free people, resulting in an overall demand figure of c. 100 million litres of wine, 20 million litres of oil and 200 million kilograms of wheat.[47] If all the above figures for the demand of wine, oil and wheat of the urban population as a whole (including overseas exports and army supplies) are added up, we arrive at 676 million litres of wine, 128 million litres of oil and 918.2 million kilograms of wheat. Using widely accepted estimates of yields per hectare, such an output would have required 3,756, 2,909 and 22,955 km^2 respectively.[48] Allowances should be made for the fact that wheat can also be cultivated between olive trees, in which case the total agricultural

45 Tchernia (1986, 85–87). The total number of shipwrecks whose cargo included Italian Dressel 1 and/or Lamboglia 2 amphorae as reckoned here (167) is derived from Parker (1992). Tchernia's procedure is the following: the number of shipwrecks (167) is multiplied by three (to account for unknown shipwrecks: 167 × 3 = 501), then by two (to account for the second half of the route from Italy: 501 × 2 = 1,002); moving from comparative evidence (i.e. eighteenth-century ships sailing between Europe and the Americas), this number is held to represent 2% of actual ships (1,002 / 2 * 100 = 50,100); the period covered by this class of amphorae covered approximately 100 years, therefore one could derive an average of ships per year (50,100 / 100 = 501); by assuming an average cargo of amphorae per ship (2,000) and average wine content per amphora (20–25 litres), it is possible to estimate the annual export of wine (501 × 2,000 × 25 = 25,050,000 litres); this is further multiplied by a coefficient of two or three (25,050,000 × 3 = 75,150,000 litres). Note that this figure does not take into account the fact that at least some of these shipwrecks were re-distributing wine within Italy and as such they are already included as part of Italian consumption levels. Other estimates: Hesnard et al. (1989, 59); Olmer (2008, 216–218).

46 Scheidel (2005, 66–67).

47 Annual per capita consumption levels: 100 litres of wine (× 1 million), 20 litres of oil (× 1 million) and 200 kg of wheat (× 1 million); based on Rosenstein (2008, 4–5). Slaves in Rome have been assumed not to have been fed with wheat imported from the provinces.

48 Annual yields per hectare: 2,000 litres (wine), 440 litres (oil) and 400 kg (wheat—net) based on Rosenstein (2008, 9, n. i–iii).

area required to meet such demands would amount to 26,711 km^2.[49] Additional land was needed to support the agricultural labour force, which for the sake of this exercise will be assumed to have consisted entirely of slaves.[50] It seems that 850,000 rural slaves (including 100,000 involved in ancillary activities) could have produced enough wine, oil and wheat to satisfy both their own needs and overall urban demand. The additional land required to feed them would have amounted to 5,061 km^2, bringing the total to 31,386 km^2.

The traditionally accepted size of Roman Italy is 250,000 km^2. Brunt originally asserted that only 100,000 (or 40 %) would have been under cultivation, a figure he obtained by estimating the amount of agricultural land needed to feed the Italian population, which in his own (low) count was 7 million, excluding Rome and some coastal towns. Lo Cascio and Witcher, however, based their calculations on higher percentages and comparatively larger areas (55 %/137,500 km^2 and 50 %/125,000 km^2, respectively).[51] It should be pointed out that the high estimated figure (3.5 million) for the free urban population employed throughout this exercise is only compatible with a 'high count' for the free population of all of Italy, as originally advanced by Lo Cascio (13.8 million). It would therefore be logical to adopt Lo Cascio's higher estimate for the agricultural area of Roman Italy.[52] But even if Brunt's view were to be accepted instead (which is doubtful), the fact remains that the total demand for wine, oil and wheat would have required less than a third of the total agricultural area of Italy and no more than 850,000 rural slaves.[53]

Do I believe all these figures to provide an approximate but fair assessment of the situation in Roman Italy during the 1st century BC? Not in the slightest—and I should also warn anyone against 'exporting' them without a clear understanding of what they are supposed to mean. These results are merely an exercise in parametric modelling for the purpose of demonstrating that, even when

49 See also Van Limbergen et al. (this volume).

50 Following Scheidel (2005, 67–71), who also includes ratios of (slave) workers per *iugerum* (= 2,518 m^2 = 0.2518 ha) based on information provided by the agronomists: wine (Colum. 3.3.8): 7 iugera/1 slave = 1.7626 ha/1 slave = 0.57 slaves/ha; oil (Cato, *Agr.* 10.1): 100 ha/21.7 slaves = 0.217 slaves/ha; wheat (Colum. 2.12): 200 iugera/8 slaves = 50.36 ha/8 slaves = 6.295 ha/1 slave = 0.16 slaves/ha.

51 Estimated area of Italy: Beloch (1886, 306–443). Estimates of the agricultural area of Italy: Brunt (1971b, 126); Lo Cascio (1999a, 238–239); Witcher (2005, 130).

52 Following Rosenstein (2009, 250).

53 Those 31,386 km^2 represent 31 % of Brunt's estimate of the agricultural surface of Italy, 25 % of Witcher's, and 23 % of Lo Cascio's. They also correspond to 13 % of the entire area of Italy as established by Beloch.

allowing for a) the highest levels of demand so far proposed and b) an agricultural system entirely and exclusively based on the exploitation of rural slave labour, the rural free population could still have inhabited between 69 and 77% of the Italian lands suitable to agriculture. While assumption (a) might require some downward adjustment (depending on which view of the scale of the Italian population and average consumption levels is adopted), assumption (b) is clearly untenable. Even more relevant is the fact that it does not really matter how profitable the whole enterprise was—and I intentionally leave the issue open. Rosenstein is fundamentally correct when he states that the size of the demand was limited, but it was limited not so much in terms of apportioned shares of profit among producers as in terms of how much good agricultural land would have remained outside the main commercial circuit.

5 Villas (Almost) Everywhere

Indeed, although the number of villas was growing across Italy between the late Republic and the early Empire, they were not to be found everywhere in great numbers; prominent exceptions are, for example, the Polcevera Valley and the area around Oria. Still, in many areas there was an increasing tendency towards establishing larger and higher-status estates at the top of the rural settlement hierarchy.[54] In the course of the preceding discussion we have located consumption within the boundaries of towns. If profits from the sale of agricultural produce were paramount in this type of settlement pattern, villas could be expected to cluster around urban sites. Keeping this in mind, let us repeat the spatial analysis applied earlier to farms and villages (see above), but this time with the buffer zones centred on towns at a notional distance of 5,000 m. This results in two main zones: N_{5000} and F_{5000} (where $S = N_{5000} + F_{5000}$).[55] The same quantification procedure has been followed, and villa number trends between *LR* and *EE* have been extrapolated (Appendix 2).

Once again, although not all survey projects proved suitable, the overall picture (based on twelve cases) is still reasonably representative.[56] With the excep-

54 Launaro (2011a, 151–158).

55 This value was chosen because it corresponds roughly to a 1-hour walking distance, which would conveniently allow a town resident to oversee his villas, and a villa resident to participate in the political-social life of his town.

56 The following projects could not be included as their survey areas were located entirely outside N_{5000}: Grandi Valli Veronesi, *Carta Archeologica della Provincia di Siena*, Scarlino, Corese Survey, Torrimpietra, Collatia and *Carta Archeologica della Valle del Sinni*.

FIGURE 4.4 *Increase in the number of villas across N_{5000} and F_{5000} as centred on towns*

tion of the *Carta Archeologica della Campania* (stable pattern throughout) and the data from the Rieti basin (decline in N_{5000}), all zones show a significant to very high increase in the number of villas.

Three observation are particularly interesting:

a) In seven areas (58 %) growth was more marked at a greater distance from towns;
b) Only three areas (25 %) experienced a steeper growth in the *nearer* zone;
c) No significant difference between N_{5000} and F_{5000} was observed in remaining two regions (17 %) (Fig. 4.4).

Although this overall pattern can be variously interpreted, the simplest conclusion would be that there was more room for new villas in peripheral areas than in central ones. This appears logical when considering that central areas were

by definition more limited in extent than peripheral ones, so that the former were much sought after and therefore probably occupied by villas relatively early on. In other words, individuals who were willing to invest their wealth in land increasingly had to resort to establishing their villas in more marginal lands.

Although fairly effective and reliable communication networks were often available (e.g. roads and inland waterways), these 'peripheral' villas did not occupy prime locations with respect to demand. Since the amount of land required to satisfy demand was relatively limited (see above), one would expect 'central' villas to have monopolized it by adopting an intensive slave-based production framework, thus acting out the scenario advocated by Carandini almost two decades ago.[57] It is therefore all the more interesting that the rural free population in the N_{5000} zones appears to have declined in only two areas: the Biferno Valley and the Ager Venusinus, the former probably as a result of a process of settlement nucleation hinging on both towns and villages (see above). The overall pattern, however, seems to suggest that even 'central' villas did not possess a monopoly on the most favourably located agricultural land, not even in the Albegna Valley. Needless to say, this conclusion contradicts the traditional notion of a greedy aristocracy evicting a defenceless free peasantry.

6 Something Old, Something New

The development of a (new) villa economy in Roman Italy has traditionally been linked to the demise of the (old) peasantry. This opposition has often been questioned in the past, and the evidence just discussed renders such an interpretation even more implausible.[58] Not only did the free rural population not decline, but more often than not, villas did not replace farms and villages. Profit-seeking, market-oriented landowners had little incentive to do so, because even the acquisition of the amount of land necessary to satisfy the highest possible levels of (urban) demand would not necessitate the eviction of peasants, which even in cases where it could be expected (i.e. near towns) seems not to have taken place, at least not systematically. On the contrary, the number of villas increased according to a pattern that was largely independent of the location of (urban) demand, and which was spatially closely linked to other forms of settlement (i.e. farms and villages).

57 Carandini (1994).

58 E.g. Rathbone (1981) already argued for the complementarity of villas and the free peasantry.

It is obvious that a new economic system emerged in Italy in the course of the 2nd century BC: villas are generally too sizeable in their processing and storage facilities not to be linked with increasingly larger estates and a general tendency towards higher levels of land-investment and surplus production. But these features, which in my opinion represent the core of what is termed a 'villa economy', did not emerge at the expense of the free peasantry. Indeed, a larger agricultural surplus could have been achieved by increasing the intensity of labour-input per unit of land and/or by extending the aggregate exploited area. The former was achieved either by increasing the number of hands (albeit at the risk of diminishing returns) or by improving the effectiveness of the existing labour force (e.g. better coordination of individual efforts, access to otherwise unavailable useful assets). The latter solution, increasing the exploited area, was carried out by simply acquiring more land and its relevant yield, however small this may have been.

But neither of these solutions made it necessary for the landowning elite to rely preferentially on slave labour and to expel former (free) owners. The latter could choose, and be allowed, to remain as tenants.[59] As Finley originally remarked, the choice between free and slave labour is better appreciated when placed in context, i.e. by accounting for local factors, ranging from the availability of manpower to customs and family traditions.[60] Besides, due to Italy's generally fragmented topography only specific regions would have been suitable to a systematic exploitation of extensive and continuous 'slave-plantation' estates.[61] In short, the rise of the villa economy can be expected to have contributed to the emergence of a wide range of local situations in terms of social and economic rural patterns, as illustrated by our own survey dataset.[62]

In a timocratic society burdened by partible inheritance, profit was far less a concern than ownership, and more to the point, land-ownership was a quintessential sign of status. It made therefore perfect sense to both strengthen and express one's own claims to social status by investing in landed property and by engaging in agriculture, animal husbandry and any other related activity. Such activities had always been perceived to be generally safer and more reliable than any other form of investment, which certainly contributed towards their great popularity among the establishment.[63]

59 Launaro (2011a, 23–26, 2011b, 170–176 and 2015).
60 Finley (1976, 117–118).
61 Capogrossi Colognesi (1992–1993, 225–228).
62 A diversity already emphasized by Lo Cascio (2002, 281–285).
63 Hopkins (1978a, 7); Launaro (2015).

But such 'old' attitudes acquired a completely 'new' dimension due to several new, interconnected processes for which the political unification of Italy in the early 3rd century BC provided a fertile substratum.[64] First, conquest represented a golden opportunity which benefited both Romans and Italian allies in different ways but at all levels: the aristocratic elite, the emerging group of merchants (*mercatores*) and businessmen (*negotiatores*), and even the common peasantry/soldiery itself.[65] This process involved a redistribution of wealth from across the Mediterranean to Italy due the latter's dominant position. A large portion of it ended up in the hands of a growing Italian elite who knew exactly the most appropriate ways to support and express its own high social standing.

Closely linked to such attitudes were the benefactions (*munera*) those same individuals bestowed on their local communities, by paying for the costs involved in lending their towns the urban character they now fully deserved (*urbanitas*).[66] On the model of Rome, these centres attracted people by providing services and employment opportunities. This triggered a much wider urbanization process than Italy had ever known before while at the same time creating an unprecedented urban market, especially for agricultural products (i.e. food).[67] Last but not least, Roman expansion created more favourable market conditions for Italian merchants to exploit, which went hand in hand with military conquest in making enterprising wealthy individuals even more so.[68]

A combination of an established aristocratic ideology, an increase in available wealth among a growing elite and expanding markets in Italy and abroad created the conditions for widespread investments in agriculture and prompted those who had the means to acquire more land. The old Italian peasantry could not oppose this process, but this did not result in its demise; it became widely involved in these great transformations and turned into one of the driving forces behind the new Italian agriculture. The villa economy had indeed sprung up at the intersection of something old and something new.[69]

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64 Morel (2007, 487–510).

65 Patterson (2010, 610–612); Rosenstein (2004, 80–81, 158–164).

66 Gros and Torelli (1992, 147–164).

67 Morley (2007b, 578–580 and 2008).

68 This is evidenced by the increasing spread of Italian amphorae throughout the Mediterranean, a process discernible already in the 3rd century BC (Graeco-Italian types), apparently peaking in the late 2nd and 1st centuries BC (Dressel 1 and Lamboglia 2 types) and lasting well into the Early Empire (Dressel 2, -3, -4 and -6 types): Panella (2001, 193–196 and 2010, 15–25); Empereur and Hesnard (1987, 30–34).

69 Launaro (2015).

Appendix I. Settlement Trends between LR and EE between N_{1000} and F_{1000} as Centred on Villas

ID	Project	Villa Trend	Zone	Farms LR	Farms EE	Farms Trend	Villages LR	Villages EE	Villages Trend	RFP Trend
1	Valli Grandi Veronesi	+	N_{1000}	1.00	1.00	+0%	·	·	·	=
			F_{1000}	11.00	17.00	+55%	·	·	·	+
			S	12.00	18.00	+50%	·	·	·	+
2	Carta Archeologica del Comune di Poviglio	+	N_{1000}	28.00	39.00	+39%	·	·	·	+
			F_{1000}	11.00	13.00	+18%	·	·	·	+
			S	39.00	52.00	+33%	·	·	·	+
3	Carta Archeologica del Comune di Modena	+	N_{1000}	44.00	50.00	+14%	·	·	·	+
			F_{1000}	12.84	16.84	+31%	·	·	·	+
			S	56.84	66.84	+18%	·	·	·	+
7	Potenza Valley	+	N_{1000}	14.50	35.50	+145%	4.50	4.50	+0%	+
			F_{1000}	9.50	17.50	+84%	1.00	2.00	+100%	+
			S	24.00	53.00	+121%	5.50	6.50	+18%	+
8	Carta Archeologica della Provincia di Siena	+	N_{1000}	71.50	59.50	-17%	7.50	3.50	-53%	–
			F_{1000}	396.00	311.50	-21%	30.00	21.50	-28%	–
			S	467.50	371.00	-21%	37.50	25.00	-33%	–
9	Scarlino	+	N_{1000}	29.00	27.00	-7%	1.00	1.00	+0%	=
			F_{1000}	41.00	44.00	+7%	1.00	1.00	+0%	=
			S	70.00	71.00	+1%	2.00	2.00	+0%	=
10	Albegna Valley	+	N_{1000}	172.00	137.00	-20%	11.00	12.00	+9%	–
			F_{1000}	193.00	190.00	-2%	16.00	13.00	-19%	–
			S	365.00	327.00	-10%	27.00	25.00	-7%	–
12	Rieti Basin	+	N_{1000}	14.00	22.80	+63%	0.90	0.70	-22%	=
			F_{1000}	12.00	16.60	+38%	0.60	1.00	+67%	+
			S	26.00	39.40	+52%	1.50	1.70	+13%	+

(cont.)

ID	Project	Villa Trend	Zone	Farms			Villages			RFP Trend
				LR	EE	Trend	LR	EE	Trend	
14	Ager Foronovanus	+	N_{1000}	12.00	20.00	+67%	·	·	·	+
			F_{1000}	0.00	1.00	+∞	·	·	·	+
			S	12.00	21.00	+75%	·	·	·	+
15	Corese Survey	+	N_{1000}	6.00	8.00	+33%	·	·	·	+
			F_{1000}	0.00	0.00	+0%	·	·	·	=
			S	6.00	8.00	+33%	·	·	·	+
16	Torrimpietra	+	N_{1000}	156.00	197.00	+26%	·	·	·	+
			F_{1000}	38.00	46.00	+21%	·	·	·	+
			S	194.00	243.00	+25%	·	·	·	+
17	Ager Caeretanus	+	N_{1000}	71.00	81.00	+14%	1.00	1.00	+0%	+
			F_{1000}	30.00	39.00	+30%	0.00	0.00	+0%	+
			S	101.00	120.00	+19%	1.00	1.00	+0%	+
18	Collatia	+	N_{1000}	99.00	239.00	+141%	25.00	32.00	+28%	+
			F_{1000}	0.00	0.00	+0%	0.00	0.00	+0%	=
			S	99.00	239.00	+141%	25.00	32.00	+28%	+
19	Biferno Valley	+	N_{1000}	8.99	5.90	-34%	1.25	3.12	+150%	=
			F_{1000}	97.23	86.28	-11%	3.00	4.00	+33%	=
			S	106.22	92.18	-13%	4.25	7.12	+68%	=
21	Liri Valley	+	N_{1000}	9.21	13.38	+45%	1.44	2.77	+93%	+
			F_{1000}	69.97	107.30	+53%	0.50	0.33	-33%	=
			S	79.18	120.68	+52%	1.94	3.10	+60%	+
22	Northern Campania	+	N_{1000}	8.67	13.33	+54%	0.67	1.33	+100%	+
			F_{1000}	2.00	4.00	+100%	0.25	0.00	-100%	=
			S	10.67	17.33	+62%	0.92	1.33	+45%	+

ID	Project	Villa Trend	Zone	Farms			Villages			RFP Trend
				LR	EE	Trend	LR	EE	Trend	
23	Carta Archeologica della Campania	=	N_{1000}	70.50	80.00	+13%	5.00	3.00	-40%	=
			F_{1000}	45.50	55.50	+22%	3.00	3.00	+0%	+
			S	116.00	135.50	+17%	8.00	6.00	-25%	=
24	Ager Venusinus	+	N_{1000}	187.00	155.00	-17%	·	·	·	–
			F_{1000}	37.00	31.00	-16%	·	·	·	–
			S	224.00	186.00	-17%	·	·	·	–
26	Carta Archeologica della Valle del Sinni	=	N_{1000}	16.50	18.50	+12%	1.50	1.50	+0%	+
			F_{1000}	35.50	34.50	-3%	2.00	2.00	+0%	=
			S	52.00	53.00	+2%	3.50	3.50	+0%	=

Appendix II. Settlement Trends between LR and EE between N_{5000} and F_{5000} as Centred on Towns

ID	Project	Zone	Farms			Villages			Villas			RFP Trend
			LR	EE	Trend	LR	EE	Trend	LR	EE	Trend	
2	Carta Archeologica del Comune di Poviglio	N_{5000}	11.00	14.00	+27%	·	·	·	3.00	6.00	+100%	+
		F_{5000}	28.00	38.00	+36%	·	·	·	4.00	10.00	+150%	+
		S	39.00	52.00	+33%	·	·	·	7.00	16.00	+129%	+
3	Carta Archeologica del Comune di Modena	N_{5000}	8.72	11.72	+34%	·	·	·	14.25	22.25	+56%	+
		F_{5000}	48.13	55.13	+15%	·	·	·	30.44	34.44	+13%	+
		S	56.85	66.85	+18%	·	·	·	44.69	56.69	+27%	+

(cont.)

ID	Project	Zone	Farms			Villages			Villas			RFP Trend
			LR	EE	Trend	LR	EE	Trend	LR	EE	Trend	
7	Potenza Valley	N_{5000}	9.50	22.00	+132%	4.00	5.00	+25%	8.50	10.00	+18%	+
		F_{5000}	13.50	30.00	+122%	1.50	1.50	+0%	4.00	6.00	+50%	+
		S	23.00	52.00	+126%	5.50	6.50	+18%	12.50	16.00	+28%	+
10	Albegna Valley	N_{5000}	129.00	102.00	-21%	7.00	8.00	+14%	44.00	55.00	+25%	=
		F_{5000}	236.00	225.00	-5%	20.00	17.00	-15%	68.00	83.00	+22%	–
		S	365.00	327.00	-10%	27.00	25.00	-7%	112.00	138.00	+23%	–
12	Rieti Basin	N_{5000}	1.80	4.00	+122%	0.60	0.20	-67%	0.60	0.20	-67%	=
		F_{5000}	24.20	35.40	+46%	0.90	1.50	+67%	4.30	7.50	+74%	+
		S	26.00	39.40	+52%	4.30	7.50	+74%	4.90	7.70	+57%	+
14	Ager Foronovanus	N_{5000}	0.00	0.00	0%	·	·	·	1.00	4.00	+300%	=
		F_{5000}	12.00	21.00	+75%	·	·	·	14.00	25.00	+79%	+
		S	12.00	21.00	+75%	·	·	·	15.00	29.00	+93%	+
17	Ager Caeretanus	N_{5000}	67.00	68.00	+1%	·	·	·	24.00	28.00	+17%	=
		F_{5000}	34.00	52.00	+53%	·	·	·	12.00	16.00	+33%	+
		S	101.00	120.00	+19%	·	·	·	36.00	44.00	+22%	+
19	Biferno Valley	N_{5000}	22.21	14.90	-33%	0.00	0.00	+0%	0.50	1.00	+100%	–
		F_{5000}	84.01	77.29	-8%	4.25	12.00	+182%	8.00	14.08	+76%	+
		S	106.22	92.19	-13%	4.25	12.00	+182%	8.50	15.08	+77%	+
21	Liri Valley	N_{5000}	53.82	84.33	+57%	1.25	0.75	-40%	6.25	10.08	+61%	=
		F_{5000}	25.36	36.35	+43%	0.69	2.35	+241%	2.75	4.92	+79%	+
		S	79.18	120.68	+52%	1.94	3.10	+60%	9.00	15.00	+67%	+
22	Northern Campania	N_{5000}	6.67	11.33	+70%	0.92	1.33	+45%	20.50	43.00	+110%	+
		F_{5000}	4.00	6.00	+50%	0.00	0.00	+0%	5.33	12.67	+138%	+
		S	10.67	17.33	+62%	0.92	1.33	+45%	25.83	55.67	+116%	+

ID	Project	Zone	Farms			Villages			Villas			RFP Trend
			LR	EE	Trend	LR	EE	Trend	LR	EE	Trend	
23	Carta Archeologica della Campania	N_{5000}	62.50	70.00	+12%	5.00	3.00	-40%	39.00	42.50	+9%	=
		F_{5000}	53.50	65.50	+22%	2.00	2.00	+0%	39.00	40.00	+3%	+
		S	116.00	135.50	+17%	7.00	5.00	-29%	78.00	82.50	+6%	=
26	Ager Venusinus	N_{5000}	134.00	104.00	-22%	·	·	·	30.00	40.00	+33%	–
		F_{5000}	90.00	82.00	-9%	·	·	·	28.00	43.00	+54%	=
		S	224.00	186.00	-17%	·	·	·	58.00	83.00	+43%	–

CHAPTER 5

The Diversification and Intensification of Italian Agriculture: The Complementary Roles of the Small and Wealthy Farmer

Geoffrey Kron

> You who have traveled through many lands, have you ever seen any land more fully cultivated than Italy? … What useful product is there that does not only grow but flourish in Italy?
>
> VARRO, Rust. 1.2.3

1 Introduction

As I highlighted in some depth elsewhere, the brilliant Swiss economist and observer of the 19th century rural society, Jean Charles Léonard Simonde de Sismondi offered one of the most devastating and eloquent analyses of the logic of extensive farming for the great landowner, as well as its wastefulness and destructiveness for the capacity of the land and the lives of those who worked it, when he declared: "… the large farmer achieves an immediate saving through the … wretchedness to which he has reduced the workers' families. A thousand acres were cultivated under the system of small farms by fifty families living in moderate ease; a large farmer … substitutes for them at once fifty day-labourer families who will live in poverty; he will gain as a consequence the entire difference between their consumption, and that of their predecessors. Can such a windfall be deemed advantageous to a nation?"

One of the starkest and most powerful illustrations of Sismondi's argument is particularly relevant to ancient historians, the contrast between the densely cultivated Roman *suburbium*, and the extensive farming of the same region, the Campagna, in the 19th century. The dense Roman network of productive small farms, with their careful drainage infrastructure, was in the hands of a handful of great landowners in the modern era, who relied on labourers drawn down

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from the Sabine mountains into the malarial lowlands to sow and later harvest cereal crops. Hired for low wages and relatively few in number, living on a bit of bread and olive oil in small villages of thatched capanne or huts, they could do little to unlock the potential of the land.[1]

Sismondi relied largely on the testimony of the literary sources for his picture of the Roman *suburbium*, but his view would soon be amply confirmed by archaeology. As Lanciani first systematically noted,[2] and decades of excavation and survey have confirmed, Latium and Campania, like much of Italy, was covered with a densely packed landscape of farmhouses and villas in which Roman farmers lived, worked, and processed crops.[3] It is profoundly impressive both how intensively the countryside was exploited and how much capital these farmers were able to accumulate and invest in farming the land.[4]

How effectively we reconstruct Roman agriculture depends on what comparative models we use in fleshing out and interpreting our limited and sometimes skewed literary and archaeological evidence. Weber, for example, fastened on Columella's references to the use of chain gangs and *decuriae* of farmhands to suggest a model of Roman farming reminiscent of America's Deep South, or of Prussia East of the Elbe, an extensive regime of cereal farming exploiting Polish serfs, which he had studied in some depth and knew

1 Sismondi (1992, 185–186).

2 Lanciani (1967, 266): "The number of these villas is really incredible: one must have scoured the Campagna as I have for twenty years; one must have explored every remotest corner, on each side of the Tiber and Anio, as I have done, to recognize how near to truth comes the theory of those who extend the surface of Rome as far as the neighbouring territories of Ostia, Bovillae, Tusculum, Tibur and Veii."

3 See Pergola et al. (2003); Jolivet et al. (2009); Volpe (2012). For villas, see the next note.

4 As Varro pointedly complained (*Rust.* 1.14.6; cf. Mari (2005)), showy and luxurious *villae urbanae* were often built on a much greater scale than the farming enterprise justified, particularly in the suburbium (Adams (2012)), along the sea (Lafon (2001); Marzano (2007, 204–207); see De Franceschini (1998, *passim*)), or in resorts like Tivoli (Valenti (2003)) or the Bay of Naples (Adams (2012)). They were also likely financed, at least in part, by urban rents, banking, trade (Carandini (1985a, 148–149); Manacorda (1981)), and the profits of conquest. Nonetheless their attached *villae rusticae* and *fructuariae* are generally more modest, more representative of the common run of large farmhouses (Busana (2002)), and more likely to be financed from agricultural revenues, so they do arguably give a fair idea of the great profits to be made from farming, as do the innumerable small farms which always dominated the landscape. It is worth contrasting Roman practice with that of the English, since, as 19th century English agronomist and advocate of 'high' or intensive farming, James Caird (1852), often lamented, England's great landowners, and their tenant farmers, invested relatively little in utilitarian farm buildings.

first hand.[5] Carandini fleshed out his influential but increasingly controversial model of slave *latifundia* in Roman Italy[6] with a detailed comparative analysis of Antebellum slavery in the US, collecting and emphasizing a lot of then long neglected archaeological data on American slaves' lives and paying well-deserved attention to the superb memoir of Solomon Northup.[7] But American plantation slavery, while market oriented and very profitable for the slave-owners,[8] seems to have been far less intensive than Roman farming,[9] and the status of the American slave population closer in many ways to that of the serfs of Prussia, Poland or Russia.[10] Unlike England, Poland, Southern Italy, or the American South, however, Roman landownership, at least in Italy, wasn't concentrated in vast estates, nor did its landlords command seemingly unlimited reserves of rural serfs, poor cottars, or landless labourers.[11]

As I have argued in a number of publications, a much more accurate impression of the nature of agriculture in most of Roman Italy, at least, can be gained

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5 See Weber (1909); for Weber's study of Prussian agriculture, see Honigsheim (1949).

6 For cogent criticisms, see, among others, Rathbone (1981, 13); Vallat (1987, 195–196); Terrenato (2001a); Marzano (2007, 125–153).

7 See Carandini (1985a, 187–206).

8 As emphasized in depth by Fogel et al. (1992).

9 Note the failure, and rarity, of experiments in applying Roman or English-style 'high farming' with convertible husbandry, crop rotations, increased livestock and manuring in American plantation agriculture, as illustrated by the experience of Langdon Carter in Richmond County, Virginia (Walsh (2010, 529–530)). As Skaggs (1969, 230–249) argues passionately, and as Raper and Reid (1941); Conrad (1965); Grubbs (1971); and Vance (1982, 86–127) document, Southern agriculture remained stubbornly poor, backward, and extensive long after emancipation.

10 Kolchin (1999). Many plantations' slave workforces lived and worked in relatively independent and self-sufficient agricultural or craft villages (e.g. Joyner (1984); Vlach (1993, 185–187)).

11 For references to the rich comparative literature, see Kron (2008a). Southern Italian *masserie* were normally from 1250 to 1500 acres, with estates of 2,500 to 5,000 acres by no means uncommon (Snowden (1986, 97)). In the American South, there were 46,274 plantations in 1860, 20,789 of them with 20 to 30 slaves, and 2,300 with 100 slaves or more (Joyner (2003, 4); citing Vlach (1993, 8)), but for these larger plantations, units of more than 1500 acres, with slave workforces ranging from 60 to 300 were not uncommon (see Young (1999, 60); Northup (1853, 243)). Slave estates on this scale are likely to be exceedingly rare for Roman Italy, however. The Romans considered 240 *iugera* or 100 acres an ample farm unit, even for a senator, although most admittedly owned several such farms. While Carandini (1985a) suggests more than 50 slaves for Settefinestre in its later phase, this is arguably an exaggeration of both the needs (Rathbone (2008, 320) suggests an estate of perhaps 200–250 *iugera*) and accommodation on the farm (Marzano (2007, 135–136)).

by using 17th century Holland or 15th century Tuscany as models, provided we realize that Roman farming at its best seems to have been significantly more intensive than both, raising more livestock than in Tuscany, and offering a wider range of products for trade than Holland, not just cheese, flowers, and vegetables, but fruit, nuts, wine, olive oil, sausages, hams, livestock, fowl, and wild game.[12] As so often, Sismondi offers one of the most powerful and effective defences of intensive mixed farming, emphasizing the creativity and care of smallholders. I would like to single out the work of Helen Goodchild and Rob Witcher,[13] who offer a more optimistic, but also more realistic assessment of the economic potential of the Roman *suburbium* to produce significant surpluses, by using archaeological evidence to model the likely balance between farming units of different size, but also by noting that the crude models of subsistence agriculture based on cereal monoculture using biennial fallow with low yields, need to be replaced with the production of a range of crops, most notably wine and olive oil, the integration of livestock, and consequently higher yields. Their results would be even more compelling and robust had they concentrated not on caloric needs, largely supplemented by imports of cheap staples, but had looked at the full range of food production, and on its cash value, however difficult it may be methodologically to model prices. Livestock in particular, wild game, as well as fruits, nuts, fresh vegetables, herbs, and flowers, will frequently command cash prices far in excess of their caloric value, and are well suited for smallholders.

Of course, as in every historical society, there is never sufficient effectual demand to justify using the most intensive methods on all possible arable land. The balance between intensive and extensive agriculture will vary, and not necessarily based on the capacity of the land, since historical and social

12 For the range of Roman agricultural products for export, see Kron (2012), and for potential comparative models for the agricultural practices of Roman small farmers, see the discussion in Kron (2008a), drawing on studies of Dutch intensive mixed farming, most notably De Vries (1974); of Tuscan small-holders and *mezzadria*, such as Pazzagli (1973); De Simonis (1983); Balestracci (1999); Herlihy and Klapisch-Zuber (1985); and of modern small farming, prior to large-scale mechanization, such as Warringer (1939), which provide particularly helpful comparative evidence. Also worth careful consideration, despite his idiosyncratic and ideological view of the political and social values of family farmers, is Hanson (1999), primarily because of his personal and family experience of viticulture, although Scheuring (1983) provides a much richer and more nuanced store of experiences and viewpoints from the same region and period.

13 See in particular Witcher (2006b); Goodchild (2007); Witcher and Goodchild (2009); Goodchild (2013).

TABLE 5.1 *Illustrative examples of intensive and extensive agricultural regimes*

Intensive agriculture	Extensive agriculture
17th c. Holland	19th c. Southern Italy & Campagna
15th c. Tuscany	19th c. Poland and Russia
20th c. Western Europe	Prussia E. of Elbe
Republican Latium, Etruria, Campania	USA's Deep South
Imperial Italy, Provence, Spain, N. Africa	Roman Gaul, E. Turkey, Egypt, Illyria

factors, tradition, and competition from well-established intensive agricultural regimes can undermine agricultural intensification in perfectly fertile, but agriculturally under-developed, regions, as in Southern Italy in the Medieval and Modern period, but not the Classical, Hellenistic, or Late Antique periods.[14] Moreover, the most advanced agricultural techniques need not be used solely to produce the highest yields using the most labour-intensive methods, but can also be used to produce reasonably good yields, in a sustainable manner, with limited inputs of labour, capital or other resources, by improving rangelands, for example, by using leys, or using biennial fallow and green manure to achieve reasonable cereal yields without intensive mixed farming. As Varro points out,[15] and as the range of approaches to organizing agricultural labour canvassed by Columella, Pliny, and Palladius hint, extensive farming still had an important role to play in the Roman empire, in regions of Northern Gaul, where the descendants of tribal chieftains still commanded vast estates cultivated by dependent farmers, or among the *obaerati* of Illyria or Egypt.[16] Nevertheless, it is fair to divide most farming regimes in broad terms into intensive or extensive systems, and I would propose that table 5.1 offers a reasonably fair sketch of some of the better documented historical examples, and some of the ancient Roman comparanda.

14 As argued in Kron (2004a).

15 Varro, *Rust.* 1.17.2.

16 For the wealth of the Gallic chieftains and their hold over their peasant population, see Caesar, *B.G.* 6.13.1–3 and note the aerial surveys of the massive Gallo-Roman villas, which develop soon after the conquest (Agache and Bréart (1975)). Varro's off-hand remarks about the dangers to be faced from brigands in Sardinia, for example (Varro, *Rust.* 1.16.2), like Pliny's attention to turnip culture or the use of the vallus in Gaul, or Columella's acquaintance with Spanish as well as Italian farming should warn us that the Roman agronomists were well-traveled and writing for an audience far beyond Italy.

While I have already discussed the evidence for the continued vitality of small family farms in Roman Italy in some depth, and have argued for their high level of productivity,[17] much more remains to be said about how we would recognize such small and medium-sized farms, and how they operated, since these farms have yet to receive adequate attention from archaeologists or agricultural historians.[18] My main concern, however, will be to explore the complex relationship between small and wealthy farmers in Roman Italy, and their complementary roles in promoting the diversification and intensification of Roman agriculture. The vigorous challenge of the Licinian-Sextian laws, a long tradition of agrarian reform, and the intense popular response to the Gracchan legislative agenda,[19] will have convinced wealthy Roman landowners that they needed to fulfill their economic goals, as much as possible, without alienating the rural population by accumulating too much jealously coveted farmland. The extent of their landownership could be disguised a great deal, and made less obnoxious, by relying on a series of modest farms, rather than large estates,[20] by offering their neighbours opportunities to farm some of their land as tenant farmers rather than relying on their own slave workforce,[21] by buying up land in the provinces, and by scattering their holdings in a variety

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17 Kron (2008a). Note also Witcher (2006b), as well as Vallat (1987). I cannot discuss any further here the theory that the rise of slave-staffed *latifundia* came to dominate Roman farming and precipitated an agrarian crisis, but, as I have stated, I believe that the Gracchan crisis was a fundamentally political one, and that the detailed syntheses of survey archaeology offered by Vallat (1987); Patterson (2006); and Launaro (2011a) all seem to vindicate Frederiksen (1970–1971) in questioning the extent of the decline of the small farmers.

18 I want to single out for special praise the outstanding work of Rathbone (2008), to which I am heavily indebted and in substantial agreement, despite some minor, if significant, differences. Archaeological research specifically devoted to investigating small farmsteads holds great promise and is long overdue. For recent work in this vein, note, for example, Ewell and Taylor (2010); Ghisleni et al. (2011), and the contributions of Vaccaro et al. and Bowes et al. to this volume.

19 Note in particular De Ligt and Northwood (2008a), especially Rich (2008).

20 This pattern will be clear from the data about landholdings in the alimenta tablets, but is also familiar from our literary sources, as in the case of Sextius Roscius of Amerina, with 13 separate farms in the Tiber valley (Cic. *Rosc. Am.* 18; cf. Carlsen (1995, 80 n. 248)).

21 See, for example, Kehoe (1988b) and especially Carlsen (1995, 103–119) for this widespread phenomenon, often encountered even when landowners rely on *vilici* to manage their farm units. The strong preference of the Roman state to parcel out its imperial estates in North Africa in small emphyteutic leases further reflects this decided cultural preference for small farms using intensive mixed farming. See Kehoe (1988a).

of regions, as Cato and Cicero clearly did.[22] But I wish to emphasize another strategy here: I will explore how, by practicing intensive mixed farming much as their poorer neighbours would do, but on a larger scale, and by concentrating on capital intensive and experimental farming, wealthy Roman farmers could both mitigate resentment at their economic success, while offering a significant stimulus to innovation on the part of poorer farmers. Wealthy Roman farmers, I will argue, seem to have taken a leading role in introducing, as I have outlined in more depth elsewhere,[23] new techniques, some Roman, and many based on a rich Hellenistic or Carthaginian agronomic tradition.[24] Improved breeds of livestock, new fruit, nut, vine and olive cultivars were constantly being introduced or created, many named for men of equestrian, senatorial or even consular rank.[25] The most capital intensive and risky of these experiments were in maritime fish farming, as men like Hortensius and Sergius Orata eventually learned how to build immensely profitable hydraulic concrete fish farms and even heated fish tanks to farm a wide range of sea fish.[26]

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22 In the case of Cato, his properties at Tusculum, Venafrum and Casinum are well known from his writings and Plutarch's testimony, which may not be entirely independent (Carlsen (1995, 17 and n. 35); Von Thielscher (1963, 17–18)), but Von Thielscher plausibly suggests the possibility that he owned an olivetum of 120 iugera at one point, as well as a suburban farm and market garden (Von Thielscher (1963, 7)).

23 Kron (2012) briefly surveys the scholarship.

24 As I have argued in greater depth elsewhere (Kron (2000; 2002; 2004a; 2004b; 2005; 2008a; 2008b; 2012)), most of the principal innovations of the modern agricultural revolution, most notably convertible husbandry, new fodder crops and methods of forage management, arable rotations, green manure, intensive manuring (Kerridge (1967)), as well as advanced viticulture, oleiculture, and tree fruit culture are well represented in the works of Varro, Columella, and Pliny, heavily indebted, as they readily admit, to Hellenistic and Carthaginian agronomic writers (for whom, see Pliny, *NH* 18.22; Columella, *Rust.* 12.4.2; Oder (1890); Gsell (1920, 1–52); Martin (1971, 53–72); Fantar (1998); Morel (2000); Van Dommelen and Gómez Bellard (2008, 22–43)).

25 Kron (2012: 162). Prominent Romans made important contributions in many instances, as Varro in particular often highlights. Nevertheless, as in the agricultural revolution of the Low Countries, many of these innovations were the work of anonymous small farmers.

26 The first experimental fishponds for farming salt water fish at various *villae maritimae* were, as Varro points out in 37 B.C., expensive to set up and far from profitable (Varro, *RR*. 3, 17, 2–3). This does not prove, however, that these fishponds were not intended as productive investments—Lucullus' fishponds produced 4 million HS worth of fish, after all. Fresh-water ponds had always been profitable (Varro, *Rust.* 3, 17, 1) and once the technical problems had been solved—due in large part to the experiments of Lucullus and others—aquaculture became an attractive investment (Columella, *Rust.* 8, 16, 6; 17, 9). See Kron (2008c); Marzano and Brizzi (2009); Marzano (2013c).

But it will be instructive to focus here on another illuminating case study, game farming, a relatively new and less capital-intensive agricultural industry initially driven by wealthy consumers and farmers. In Varro's *de Re Rustica*, he and his fellow farmers and agricultural experts, most of them senators or consulars, were extremely enthusiastic about the profits to be made from *pastio villatica*, as fish and game farming were called, claiming of one small game farm, that it "received, because of such husbandry, more than 50,000 HS from the villa every year."[27] Eventually, as access to the requisite expertise, and the animals themselves, became more widely available, smaller farmers also entered the industry, until on many tables venison, boar and hare were nearly as common as beef, pork, and lamb, and, as we see in Palladius, care of the leading game birds was treated as if it was as routine as the raising of chicken, duck, goose and squab.[28]

2 Family Farmers in the Works of the Roman Agronomists

But how do we get an insight into the world of the typical Roman farmer? We will discuss the evidence of archaeology below, but the agronomists reflect the practice of small and medium scale farmers much more than has been acknowledged, particularly Cato the elder. Cato's work is a canny combination of homespun farm wisdom and sound agricultural practice,[29] well calculated, like Caesar's commentaries in a different context, to enhance his well-honed public image among the many small farmers from whom he drew his political support. It is inelegant to be sure, but profoundly important as an account of Cato's own experiences and observations of farming,[30] and through it, of the values, beliefs, and practices of innumerable Roman farmers, small, medium

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27 Varro, *Rust.* 3.10.14.

28 Palladius 1.23–31 advising how to raise, in addition to chickens and geese, pigeons, turtle doves, thrushes, peafowl and pheasant. See further Bartoldus (2012, 181–213) and compare the significantly more elaborate discussion in Varro and Columella (Rinkewitz (1984); Kron (2008a; 2014)).

29 Like Dyson in the same volume, and, I suspect, many generations of agronomists and farmers, from Varro (1.2.28) on, who go well beyond, but offer few substantive objections to, the advice offered by Cato, I object to the dismissal of this work in Terrenato (2012), except on the grounds of organization and literary merit. I especially disagree with his claim that a man of Cato's social position could not take an active interest in micro-managing the farming of his own land, or at least represent himself as someone who does.

30 See e.g. Von Thielscher (1963, 3–18).

and large.[31] He is eager to highlight traditional practice, with careful attention to ritual, for example, and restrictions on performing agricultural work on religious holidays,[32] and seems to studiously avoid alluding to Carthaginian and Hellenistic agronomy, unlike his extant successors.[33] Nevertheless, he does acknowledge some of the latest developments in farming practice, alluding to proven new wine, oil and fruit cultivars, for example.[34] His advice for the care of vines and olives, and for processing wine and olive oil is particularly sophisticated and detailed.[35] Cato puts a great deal of emphasis on fodder management, giving sound advice,[36] suggesting the creation of water meadows, for example, but without discussing artificial seeding, burning, leys, intervals of arable cropping or other methods of grazing improvement noted by Pliny, Varro, and Columella.[37] It is particularly significant that alfalfa, tree medick, and other proven forages highlighted in the later agronomists, building on Hellenistic or Carthaginian innovations, are not mentioned.[38] His awareness of green manure is well-informed and argues for significant improvements in productivity, particularly the emphasis placed on lupines, which are outstanding sources of phosphorus as well as nitrogen, as recent scientific research has confirmed.[39] Cato not only insists that his *vilica* raise plenty of chickens and eggs for the *familia*,[40] but gives detailed instructions for cramming and fattening

31 Rathbone (2008, 323) is surely right to insist that Cato's advice is relevant to farming operations on many different types of farms, not just his own large slave-staffed vineyard and *olivetum*, which he naturally discusses in the greatest detail.

32 Cato, *Agr.* 132; 134; 138–141.

33 For just a handful of the many possible references, see Varro, *Rust.* 1.1.8–10; Columella, *Rust.* 1.1.7–12; Palladius 1.6.5; 1.6.9; 11.14.1; 12.10.1; 12.12.1. See also Martin (1971, 53–72); Kron (2002, 65–68); Georgoudi (1990, 65–72). But do note Diederich (2007, 15–25), for Cato's awareness and incorporation of some of this new material, despite his clear preference to be seen as exemplifying traditional Roman practice.

34 Cato, *Agr.* 6.1–4; 7.3–4; 8.

35 Rossiter (1981).

36 See Cato, *Agr.* 5.8; 27; 50.1; 53–54.

37 Cato, *Agr.* 8.1.

38 Compare the range of fodder crops in the later agronomists outlined in Kron (2004a).

39 Cato, *Agr.* 5.8; 36.2; cf. Columella, *Rust.* 2.10.1; Spurr (1986, 113–115). As Carlos Aguiar first brought to my attention (pers. comm.), kindly offering recent scientific studies, lupines not only fix nitrogen, like other legumes, but are able to tap into organic or inorganic sources of Phosphorus unavailable to most plants (Davis (1991)), a critical advantage given the difficulty of finding effective Phosphorus fertilizers in many farming systems (Vance et al. (2003)).

40 Cato, *Agr.* 143.3.

geese and squab.[41] He is especially careful to praise good farmers and manufacturers of farm equipment with whom he has had some dealings.[42] Although he does not hide the fact that he delegates the day-to-day running of his farms to a *vilicus* and *vilica* (he was, after all, a very active general and politician) they are expected to operate the farm as a Roman family farmer and his wife might,[43] with their children, relatives or affines, and any hired or slave labour.

More importantly, perhaps, Cato's method of managing his *familia* offers insight into the traditional, rather patriarchal, way in which slave labour was likely incorporated into small family farms, reminiscent of the treatment of labourers in husbandry in late Medieval and early Modern England, as described by Kussmaul, who boarded with their masters, before they were replaced by cheaper casual labourers living in distant villages.[44] Unlike the overseers of large plantations in the Old South primarily charged with plying the whip to extract as much work as possible from the hands available,[45] Cato's *vilicus*, like the man himself, in his younger years, was expected to "know how to perform all the operations of the farm, and actually perform them" so that he might learn "what is in the minds of his *familia*, and they will perform their work more contentedly." Moreover, the *vilicus* must be "the first out of bed, the

41 Cato, *Agr*. 89–90.

42 Cato, *Agr*. 135.1–4. The specificity of Cato's advice, as well as the dependence of most farmers, including small ones, on urban markets for manufactured tools and other *instrumentum fundi* is very striking.

43 *Pace* Terrenato (2012), but Cato himself proudly asserted he had worked his own farm, at least in his youth, ORF fr. 28; Plu. *Cat. Ma*. 3.2. As Rathbone (2008, 322 n. 50) notes, citing Cic. *S. Rosc*. 18, Roscius of Ameria's son also ran several of his father's farms, and may well have taken an active rather than purely supervisory role. Cato's advice for the *villica* involves a number of house-keeping tasks, care for barnyard fowl, preservation of fruits and vegetables, recipes for bread, *libum, placenta* and other traditional recipes, some of ritual significance, for the *familia* (Agr. 74–82).

44 For the advantages boarding in had in terms of diet, including the addition of beef or other meat to their diet, see Kussmaul (1981, 40–42). For the gradual extinction of the practice of keeping labourers in husbandry in 19th century England, see Kussmaul (1981, 130–134).

45 The memoir of Solomon Northup describes the constant whipping to which slaves were subjected on both large plantations, and on smaller farms (Northup (1853, 165)). For the use of whipping to keep up the pace of work over 13–16 hour workdays on a large Virginia farm, see Walsh (2010, 531). Corporal punishment was also employed to discipline Italian *bracchianti* in Puglia (Snowden (1986, 30–31)). For a more detailed comparison of the masters' attitudes towards the use of corporal punishment in American and Roman slavery, arguing for a harsher approach in the former, see Del Lago and Katsari (2008).

last to go to bed."[46] Columella does not describe doing farm work alongside his slaves, but does advocate talking to them in depth and joking with them, motivating them to work harder and more efficiently by canvassing their opinions.[47]

In the Roman countryside, teeming with small-holders with secure tenure of at least some of the land they needed to work, but often hard pressed to keep up with all of the demands of working their land well, the respect of one's neighbours was potentially even more important, as Cato clearly understands, since "it will be easier to sell your produce, easier to let out your work, easier to secure extra hands"—and easier to get help building and making improvements to your farmstead.[48] Columella, who seems more concerned to appeal to a wealthier and more prestigious readership, speaks as though they will look upon their

46 Cato, *Agr.* 5.5.

47 Columella, *Rust.* 1.8.15; cf. Varro, *Rust.* 1.17.6. Similarly enlightened or humane advice is given by Varro, *Rust.* 1.13.2; 1.17.4–5; 6; Columella, *Rust.* 1.8.16–19. Note also Varro, *Rust.* 1.13.1: "A place should be provided for the hands to stay in when they are tired from work or from cold or heat, where they can recover in comfort," a marked contrast from Edwin Epps farm, where Northup writes that: "the hands are required to be in the cotton field as soon as it is light in the morning, and, with the exception of ten or fifteen minutes, which is given them at noon to swallow their allowance of cold bacon, they are not permitted to be a moment idle until it is too dark to see, and when the moon is full, they often times labor till the middle of the night." Northup (1853, 167). Moreover, slaves were expected to work regardless of the weather, but were not, as Columella recommends, furnished with leather rain gear (*Rust.* 1.8.9). On the other hand, while Columella is careful to provide against abuse of slaves, particularly those being punished with fetters, he is eager to take advantage of spirited criminals condemned to the chain gang for work on his vineyards, so much so that he feels obliged to apologize for it (*Rust.* 1.9.4–5). For agricultural labour conditions and methods of management see Heitland (1921); Kaltenstadler (1978); Carlsen (1995); Roth (2007); Kehoe (1997 and 2012).

48 "Be a good neighbour, and do not let your people commit offences. If you are popular in the neighbourhood it will be easier for you to sell your produce, easier to let out your work, easier to secure extra hands (*operarios facilius conduces*); if you build, the neighbours will help you with their work, their teams, and their materials; if trouble comes upon you, which God forbid, they will be glad to stand by you." Cato, *Agr.* 4.2; cf. Columella, *Rust.* 1.8.8, for farmhands borrowing tools from neighbours. For an absentee farm owner, whether relying on tenants or a *vilicus* with a slave staff, the eyes of neighbours one could trust would surely be extremely valuable in catching any theft, corruption or incompetence, always a significant risk (Columella, *Rust.* 1.7.6–7). For the importance of access to additional labour for the harvest in particular, although it could be obviated somewhat by selling the crops to contractors, see the discussion in Marcone (2009); Capogrossi Colognesi (2012, 146–155). For the organization of the agricultural labour involved in the harvest in general, see Shaw (2013).

neighbours as potential tenants, although he is equally eager to maintain their goodwill rather than try to insist on one's legal and contractual rights at the cost of one's popularity.[49]

Although Cato might own more land and farm on a significantly, but not radically, larger scale than most of his neighbours, he faced many of the same challenges, was farming many of the same crops, and using similar methods. Therefore he, Varro, and Columella frequently emphasize the need to carefully observe one's neighbours' farming practices, particularly those long established on the land. The lively way in which the interlocutors of Varro's *de Re Rustica* observe and comment on the profitability of their respective farms and those of other landowners notable for their success, skill or innovations[50] surely reflects a long-standing obsession of many small farmers as well, and helps to explain the healthy market for agricultural manuals.

3 Recognizing Small Family Farms in the Roman Countryside

Small farmhouses, although rarely sought out for excavation or study, are still very well represented in the archaeological literature, and I have collected together a small sample of tolerably well-preserved small farms which preserve plans permitting an estimate of their size (see fig. 5.1). These farmhouses cluster clearly around discernable peaks or modes at 150–200 m^2 and 450–500 m^2 in size.

The Villa Regina at Boscoreale, at 450 m^2 with 7 rooms is a well-preserved representative of the larger of these two classes of small farmsteads, but began life as a much smaller three room farmhouse of 240 m^2.[51] It had a residential suite with a *triclinium* decorated with frescoes, paid for in all likelihood by the revenues of a small vineyard of between 7 and 10 *iugera*, well within the capacity of a single vinedresser, according to Columella. The property had 18 *dolia* in the courtyard to store wine, permitting a gross income of well over 7,000 HS from the vineyard alone, significantly more if it were of good quality. But there is also evidence that fruit trees and pigs were kept, that the owner had a yoke of oxen, and that three men had worked on the farmstead, leaving graffiti, and they may well have all belonged to the owner, perhaps simultaneously. I suspect all but the poorest Roman farmers owned a yoke of oxen, but it is not

49 Columella, *Rust.* 1.7.1–4.

50 For just a few examples, see Varro, *Rust.* 3.2.15; 3.8.10; 3.10.13–4.

51 See De Caro (1994); Adams (2012, 306, fig. 96); Rathbone (2008, 317–318).

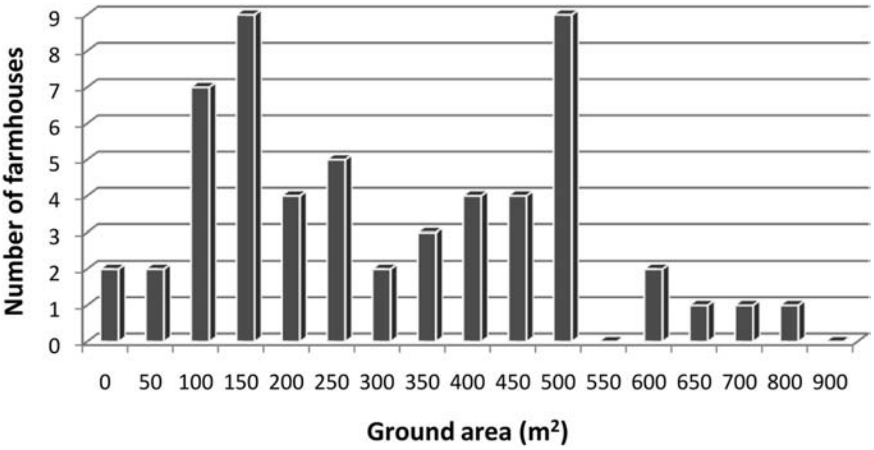

FIGURE 5.1 *Sizes of excavated small farmhouses in Roman Italy (For the references for this sample (N = 56), see appendix 1)*

unlikely that the farmer also possessed a fair amount of arable land, perhaps the 20 *iugera* Rathbone suggests.

Rathbone highlights the case of the finely built 57 m^2 *opus reticulatum* farmhouse on Monte Forco,[52] suggesting very plausibly that it was built by the state as part of a new colony and attached to a small plot. As a simple but sturdy dwelling, which would give a new farmer shelter until he could gradually construct the outbuildings necessary for a proper farmstead, such constructions, some of which were even smaller, were probably not uncommon. On the other hand, the fate of this structure, which seems to have been subdivided for cattle stalls and used as a byre, suggests that there was little demand for such small structures, even well-built ones, as permanent farmhouses.

Small one- or two-room shacks are not uncommon for rural labourers or cottars in many societies, as we find in 19th century England or the slave shacks which were still inhabited by plantation sharecroppers in the Deep South into the 1930s and beyond.[53] But rural labourers, cottars, or dependent

52 See Jones (1963); Rathbone (2008, 311–312). As Jones (1963, 150) notes: "The structure was built in *opus reticulatum* … the local workmen helping with the excavation thought the standard of construction higher than that of their own homes in the older quarter of Rignano Flaminio."

53 See, for example, Carandini (1985a, 192); Ascher and Fairbanks (1971); Vlach (1993, 153–182); Young (1999) and Joyner (2003) for slave accommodation in the antebellum period. Valuable first-hand descriptions come from Olmstead (Vlach (1993, 156); Northup (1853, 170–171)). See Vlach (1993, 179 fig. 11.16; 180 fig. 11.17; 181 fig. 11.19; 182 fig. 11.20) for photos

share-croppers were generally living in rented accommodations provided by a farmer or landowner, and had little leisure or incentive, or sometimes even a legal right, to improve or build onto their cottages.[54] Farmers, even relatively poor tenants with tolerably secure tenure or perhaps some land, will have been much more likely to invest in their farmhouses over time,[55] as we see in two examples from Northern Italy,[56] where small one or two room farmhouses like those of Monte Forco have been expanded to form well-appointed small farmhouses.[57] With careful study, many more examples could be offered of the expansion of small farmhouses, a few of which are listed in table 5.2, below.

In all but two of these cases, they increased significantly in size, but seem to have remained the home of an active farmer and owner-occupier. For the Villa Regina at Boscoreale it seems that the additions to the farmhouse were accomplished piecemeal, as may well have been true in a number of instances, as the proprietors gradually built up enough funds to build further.[58]

The prosperity of many of these small and medium sized farmsteads is evident from the investments made in oil or wine processing equipment.[59] A good example is provided by Posta Crusta farm, near Foggia in Apulia, a small

showing the continued habitation of these cabins into the late 1920s and mid-1930s. Rathbone's (2008) suggestion that there was a large but archaeologically invisible class of very small farmsteads, including, perhaps, small thatched huts, scattered throughout the Roman countryside seems unlikely to me, since the Roman sources, as Rathbone himself acknowledges (2008, 311 n. 23 regarding Vitr. 2.1.2–6) suggest that such huts had largely disappeared in Central Italy after the Archaic period, and were such huts common, they would no doubt be excavated in some number, as they often are in Archaic villages, for example, in Gaul, or even in more conservative Gallo-Roman settlements (which is where Pliny, who is well acquainted with Gallic agricultural practice, or other Roman writers might have observed them—pace Rathbone (2008, 311 n. 23)).

54 American slaves might make very modest improvements, keeping flowers or fashioning home-made cupboards, tables or benches, with pictures or knick-knacks to make their environment more tolerable (Vlach (1993, 166–167)).

55 Roman law for agricultural leases provided relatively good protection for tenants carrying out improvements on farmsteads (see Kehoe (2007a and 2012)).

56 Boschi S. Anna (Vr) along the Via Fittanza in the territory of Verona (Busana (2001, 510–511 n. 6 and fig. 2 and 2002, 262–264); and Archi di Castelrotto near Lessini in S. Pietro in Cariano (VR) (Busana (2001, 510–511 n. 5 and fig. 1 and 2002, 341–343).

57 As rightly noted by Rathbone (2008, 323) in attempting to explain the absence of the extremely small farmsteads he posits.

58 Carter (2006, 146) argues for a similar construction history for Fattoria Stefan at Lago di Lupo in the territory of Metaponto, with the structure growing by accretion in response to the needs of the farm.

59 The investments of Roman smallholders in wine presses should be compared with the

TABLE 5.2 *The Expansion of small farmhouses*

Name	Phase I	Phase II	Phase III	Reference
Boscoreale Giuliana	180	530		Rathbone (2008, 318–319)
Villa at Mancamasone	131	537		Torelli (2012, 22 fig. 1.10)
Villa Regina at Boscoreale	240	450		De Caro (1994); Adams (2012, 306 fig. 96); Rathbone (2008, 317–318)
Farm at Montalbano	490	630		Giordano (2012, fig. 1.3)
Farm at Sant'Angelo Grieco	33	137		Giordano (2012, fig. 1.4)
Farm at Masseria Durante	138	435.6	534.8	Giordano (2012, fig. 1.5)
San Rocco Villa	415	4400		Blanckenhagen et al. (1965, 58 fig. 2)
Auditorium Villa	266.3		773	Terrenato (2001, 8 fig. 3)

399 m^2 *villa rustica* of 13 rooms, including a substantial residential suite of four or five rooms, two decorated with frescoes and two rooms provided with *opus signinum* floors furnished with mosaic and *opus sectile* inserts.[60] As Rossiter points out,[61] the oil plant corresponds closely to Cato's recommendations, not only providing a *torcularium* and separation tank, with 13 *dolia* to store the olive oil, but also with a milling room and washing room with well and cistern. Many more examples can be offered, however, of small farmhouses with wine or oil presses or storage facilities on a significant scale (table 5.3).

Quite a few small farms were furnished with *torcularia* or storage *dolia*, including at least two modest farmhouses of around 150 m^2. A wine press, particularly the large beam presses which leave clear archaeological evidence, is a significant investment, and suggest healthy profits and a willingness to re-invest them in improved productivity.[62] The capacity of some of these small

use of *karnemolen*, a large horse-powered butter churn gradually introduced by Dutch dairy farmers with more than around 10 cows in the 17th century (De Vries (1974, 184–185)).

60 De Boe (1975); Rathbone (2008, 315–316).

61 Rossiter (1981, 357).

62 We tend to judge the vast expansion of olive oil production (Kron (2012, 162–165); Marzano (2013a)) based on spectacular large villa complexes with multiple presses (Kron (2012, 170); Marzano (2013b)), but presses on smaller farms like these, given their much greater numbers, are potentially more important.

TABLE 5.3 *Farms with wine or oil processing or storage equipment*

Name	Reference	Area	Dolia	Press
Posta Crusta	De Boe (1975); Rathbone (2008, 315–316)	399	13	Y
Boscoreale Giuliana II	Rathbone (2008, 318–319)	530		Y
Villa Maricigliana	Marzano (2007, 508 fig. L225)	144+		Y
Lucanian farm at Montegiordano	Torelli (2012, 18 fig. 1.5) after Guzzo (1990, 325)	487		Y
Posto villa	Adams (2012, 277 fig. 38)	155	1	Y
Villa rustica at Boscoreale (30)	Adams (2012, 301 fig. 86) after Della Corte (1921); Carrington (1931, no. 26)	540.6	5	
Villa of Domitius Auctus	Adams (2012, 311 fig. 106) after Sogliano (1899)	359	6	
Villa at Carmiano	Adams (2012, 329 fig. 142) after Camardo and Ferrara (1989)	410	12	
Villa rustica at Boscoreale (39)	Adams (2012, 310 fig. 104) after Sogliano (1898)	180	4	
Villa of Crapolla at Scafati	Adams (2012, 312 figure 108)	210	4	
Villa Regina at Boscoreale II	De Caro (1994); Adams (2012, 306 fig. 96); Rathbone (2008, 317–318)	450	18	
Giardino Vecchio	Rathbone (2008, 315–316)	500+		Y
Farm at Montalbano I	Giardino (2012, fig. 1.3)	490	5	
Farm at Montalbano II	Giardino (2012, fig. 1.3)	630	5	
Villa rustica no. 33	Carrington (1931)	632	35	Y

farms to store wine or olive oil is also impressive, given that the massive villa of Settefinestre boasted only 76 such *dolia* in its *cella vinaria*.[63]

In several cases these small farmers were making sufficient income to hire wall painters or mosaicists to decorate their farmhouses, as we briefly summarize in table 5.4, below.

The frescoes preserved on the walls of several Campanian farmhouses, we arguably owe to the eruption of Vesuvius, but floors of *opus signinum*, mosaics and even some inclusions of *opus sectile* are to be found from all over Italy, in a number of small farms, which had been abandoned but not entirely stripped.

63 Carandini (1985a, 152 fig. 152).

TABLE 5.4 *Decoration in small farmhouses*

Name	Area	Walls	Floors	Reference
Posta Crusta	399		*o. signinum*; mosaic; *o. sectile*	De Boe (1975); Rathbone (2008, 315–316)
Villa S. Basilio	668		mosaic; *emblem*	Marzano (2007, 534 fig. L239); De Franceschini (2005, no. 35)
Villa rustica no. 33	632	4		Carrington (1931)
Villa rustica no. 22	511.5	2		Adams (2012, 304 fig. 92) = Carrington (1931, no. 22), after Paribeni (1903)
Villa rustica no. 27	547.5	9		Adams (2012, 308 fig. 100) = Carrington (1931, 120 fig. 16 no. 27)
Villa Regina at Boscoreale II	450	1		De Caro (1994); Adams (2012, 306 fig. 96); Rathbone (2008, 317–318)
Giardino Vecchio	500+		*opus signinum*	Rathbone (2008, 315–316)
Villa Maricigliana	144+		*cocciopesto*; mosaic	Marzano (2007, 508 fig. L225)
San Rocco Villa I	415		*o. signinum; o. spiccatum*	Blanckenhagen et al. (1965, 58 fig. 2)

4 The Complementary Role of the Wealthy Farmer: Capital-Intensive and Innovative Farming

With even small landowners like the owner of the Posta Crusta farm investing in state-of-the-art wine presses and the like, wealthy farmers were obliged to find creative ways to leverage their advantages of education and capital, and their ability to experiment and take significant financial risks, to keep ahead of the common run of Roman farmers, who had always shown themselves adaptable, hardworking and nimble. I will discuss just one possible strategy of intensification which allowed wealthy farmers to distinguish themselves from their neighbours: game farming.[64]

64 I do not intend to discuss the agronomic techniques in any detail here, as I survey some of the recent literature elsewhere (Kron (2014), but see Rinkewitz (1984, 29–73); Bortuzzo (1990); Peters (1998); Kron (2008b, 188–204); Bartoldus (2012, 181–213)); for modern techniques, generally very similar, see Coles (1971). For the gastronomic value of a range of rare or unusual game birds see Aksakov (1998) with specific references by species in Kron (2008b, 193–203, table 8.4).

Varro credits Marcus Seius as one of the first and most aggressive in taking Hellenistic and Carthaginian expertise in raising game and applying it on a commercial scale. As Varro states: "the Carthaginian Mago, Cassius Dionysius, and other writers have left in their books remarks on them, but scattered and unsystematic. These Seius seems to have read, and as a result, he gets more revenue from such pasturing out of one villa than others receive from a whole farm."[65] Game farming had had a very long history in Rome, where *leporaria* or hare-warrens, which had been created to keep hares, were gradually expanded to raise wild boars and red, fallow or roe deer, finally incorporating such exotic animals as the oryx, gazelles, or ostrich.[66] Roman peasants had raised fine chickens, geese and ducks for centuries,[67] and by the late Republic, they were breeding excellent large chickens, comparable to many of the best modern varieties, as well as doves and pigeons.[68]

But the growing popularity and prestige of wild game, and the wide variety of species which were prized, emerges clearly from the wealth of representations in art. Peacocks, pheasant, partridge, quail, guinea fowl, woodpigeons, rock doves, snipes, purple gallinules, song thrushes, ducks, geese and many other game birds, figure prominently on mosaics and paintings, decorative still lives,[69] as well as in images of farms and villas.[70]

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65 Varro, *Rust.* 3.10.13–4.

66 Columella, *Rust.* 9.1.1; Varro, *Rust.* 3.3.8. For the full range of large game attested, see Kron (2008a, 189–191, table 8.3).

67 As Varro explains: "… first came the ancient stage of our ancestors, in which there were simply two aviaries: the barn-yard on the ground in which the chickens fed … and the one above ground, in which were the pigeons, either in cotes or on the roof of the villa." Varro, *Rust.* 3.3.6.

68 See Kron (2008b, 180).

69 For mosaics and frescoes representing game-birds, see Tammisto (1997); Watson (2002). Some excellent images are conveniently collected in Jashemski and Meyer (2002, 128 fig. 111 (partridge); 134 fig. 118 (turtledoves); 137 fig. 120 (quails); 145 fig. 129 (woodpigeon); 330 fig. 274 (ducks); 363 fig. 296 (rock partridge); 365 fig. 297 (mallard ducks); 366 fig. 298 (graylag goose); 371 fig. 303 (greenfinch); 373 fig. 305 (rockdove); 374 fig. 307 (woodpigeon); 375 fig. 308 (crow); 376 fig. 309 (quails); 379 fig. 313 (snipe); 385 fig. 319 (song thrush); 389 fig. 324 (peacock); 391–392 figs. 326–329 (purple gallinule); 398 fig. 334 (blackbird); 399 fig. 335 (song thrush); 429 fig. 352 (shelduck and mallard duck); 431 fig. 354 (song thrush)). Although game birds are a particular favourite, larger game animals were also represented in Roman art, as in the bronze sculpture group of a wild boar attacked by dogs from the House of the Citharist in Pompeii (Jashemski and Meyer (2002, 443 fig. 360) or the mosaic of the same subject from the House of the Wild Boar (VIII.iii.8).

70 To list just a few examples, note the Tabarqa mosaic from the Bardo Museum, the Mai-

In response to the growing market for rarer, more expensive game fowl, particularly those most difficult to raise in captivity, it made economic sense to invest in more elaborate facilities, such as the towers at Settefinestre, designed to serve as dovecotes,[71] until Varro could claim that many Roman farmers "have larger buildings for the sheltering of fieldfares and peafowl than whole villas used to have in those days."[72]

Although the investments were often significant, the profits of *pastio villatica* could be spectacular.[73] As Varro boasted to Q. Axius, his maternal aunt's villa, on the 24th milestone on the Via Salaria, was set up so that "from the aviary alone which is in this villa, I happen to know that there were sold 5,000 fieldfares, for three denarii apiece, so that that department of the villa brought in 60,000 sesterces—twice as much as your farm of 200 *iugera* at Reate brings in,"[74] and he claims that some pigeon breeders were willing to spend up to 100,000 HS on buildings and equipment,[75] including massive columbaria with thousands of niches, just to raise pigeons. There was not only a significant market for squab, but also for breeding pairs which could be used to start out a farmer in his own business keeping pigeons.[76]

The peacock, which had been bred by the Greeks from at least the 5th century BC, was one of the first exotic game birds to be raised commercially on a significant scale, as seems clear from their modest price in Diocletian's price edict, thanks in large part to Q. Hortensius' popularization of their consump-

son de Cato mosaic (Dulière (1974, 55 no. 205 and plate LI)); the Maison des Pêcheurs-chasseurs mosaic (Alexander et al. (1976, 31 no. 278B)); and the hunt mosaic from the Caddeddi villa on the Tellaro river (near Noto, Sicily) (Voza (2003, cover image); Wilson (2016, figs. 5; 5.24–28; 5.31–34)) with images of pheasant, mallard, woodpigeon, rock dove and Barbary partridge.

71 See Carandini (1985a, 156; 162). For discussion of dovecotes and other elaborate and sophisticated habitats and enclosures created for game, see Kron (2008a, 192); Bartoldus (2012, 195–199); Kron (2014). The provisions for ducks are particularly impressive (Columella, *Rust.* 8.15.5; cf. Coles (1971, 238–243 and 283–290)).

72 Varro, *Rust.* 3.3.7.

73 See, for example, Columella, *Rust.* 8.1.2; Varro, *Rust.* 3.6.1; 3.6.6; Pliny, *NH* 10.45; Rinkewitz (1984, 21–23 and 111–130).

74 Varro, *Rust.* 3.2.15. Elsewhere, Varro has Lucius Abuccius claim that he makes 20,000 HS from *pastio villatica*, compared to only 10,000 from his arable, and if he could get a maritime villa, he might get 100,000 HS from its fishponds (Varro, *Rust.* 3.2.17).

75 Varro, *Rust.* 3.7.11.

76 "At Rome, if the birds are handsome, of good colour, sound, and of good breed, single pairs sell usually for 200 HS; but unusually fine ones sometimes for 1,000 HS. When a trader wanted recently to buy such birds at this price from Lucius Axius, a Roman Knight, he said he would not sell for less than 400 denarii." Varro, *Rust.* 3.8.10.

tion.[77] The high value their eggs achieved, 5 denarii a piece, probably speaks, like the value of breeding pigeons, to the eagerness of farmers to acquire peafowl which they could breed themselves. Guinea fowl, native to North Africa and virtually domesticated, remained uncommon in Varro's Italy and hence more lucrative to introduce.[78]

The Roman agronomists were keenly aware that *pastio villatica* demanded a broad market in order to be profitable, but many game birds were too expensive. Still their consumption was eventually democratized, at least initially, as the result of triumphal feasts and the banquets of the *collegiae*,[79] suggesting that, at least on special occasions, even Roman craftsmen and skilled workers could share in the newest culinary craze. But eventually ordinary Romans would not have to wait for a triumph or a club banquet to enjoy fish or game, but could buy it from their local butcher or shop.

A chance find of 28 thrush breasts preserved in honey and sealed in a pot, in the latrine of a legionary camp in Holland, shows that game meat was being transported throughout the empire, and reminds us that the taste of Roman legionaries for wild game, well attested on military sites, was not necessarily satisfied by hunting. Olive and Deschler-Erb have published a villa site in Switzerland in which large numbers of red deer were butchered and their meat smoked and exported in amphorae manufactured on the site.[80]

Although wild game was considered a prestigious meat, it was eaten in significant quantities throughout the Roman Empire. I have surveyed more than 380

77 "It is within our memory that flocks of them began to be kept and sold at a high price … As [Q. Hortensius'] example was quickly followed, the price has risen to such a point that the eggs will sell for 5 den. each, and a flock of 100 easily brings in 100,000 HS—in fact, Abuccius used to say that if one required 3 chicks to every hen, the total might amount to 60,000 HS." Varro, *Rust.* 3.6.1; 6. For the raising of peafowl, see Columella, *Rust.* 8.11.3–17; Varro, *Rust.* 3.6.3–5; Palladius 1.29.4; Rinkewitz (1984, 54; 67); Bartoldus (2012, 207–210).

78 "The African hens are large, speckled, with rounded back … These are the latest to come from the kitchen to the dining room because of the pampered tastes of people. On account of their scarcity they fetch a high price." (Varro, *Rust.* 3.9.19). See Watson (2002, 384–385) for their domestication on the island of Leros, dating to at least the 4th century BC. They had ceased to be kept as domestic fowl by the Medieval period, until domesticated once again in Italy and France around 1955 (Lamblard (1975)).

79 "But to reach such a haul as that [60,000 HS] you will need a public banquet or somebody's triumph … or the club dinners (*cenae collegiarum*) which are now so countless that they make the price of provisions go soaring … In this time of luxury it may fairly be said that there is a banquet every day within the gates of Rome." Varro, *Rust.* 3.2.16.

80 Lauwerier (1993); Davies (1971); Olive and Deschler-Erb (1999).

TABLE 5.5 *Most common species of game from Roman sites*

Species	Sites	Species	Sites
Red deer	233	Partridge	39
Duck	190	Grouse	35
Chicken	184	Swan	27
Hare	157	Elk	26
Goose	148	Song thrush	23
Roe Deer	143	Rabbit	21
Wild Boar	113	Quail	14
Pigeon	97	Fallow Deer	13
Thrushes	79	Peacock	9
Woodcock	48	Capercaillie	7
Crane	43	Pheasant	4

archaeological sites from Italy, Germany, France, Greece, Bulgaria, Romania, Slovakia and the Czech republic with published faunal studies, and most show some bones from wild game or barnyard fowl (table 5.5).

Red deer is by far the most popular species, but the hare, roe deer, wild boar, pigeon, thrush, crane and partridge are all well-known from the literary sources[81] and well attested in the archaeological record. Whether one looks in cities, towns, or villages, or in the countryside, in rustic or luxury villas, wild game was widely available, and in many contexts was a very significant element of the diet. Although a number of substantial deposits, particularly from cities, show only around 1–3% of meat from game,[82] and quite a few Roman bone deposits consisted entirely of domestic livestock, remarkably high percentages of game can be found, frequently ranging from six or seven up to 20% or more (table 5.6).

To put these figures in context, only among contemporary French and Italians does one find game consumption, which approaches the level we find even in the lower tier of these game-rich Roman sites. As late as 1973 less than 0.5% of meat consumption in the developed world consisted of wild game. Game represents as much as 7.8 or 5.2% of meat consumption in France and Italy respectively today, but most nations eat very little. Only 1% of North Amer-

81 Kron (2008b, 189–191 Table 8.5).

82 MacKinnon (2004, 228–229 and App. 13).

TABLE 5.6 *Game as a percentage of meat consumption*

Site	Type	Date	% Game
Herdonia	city	2–5 AD	4.1
Pompeii	city	1 BC–1 AD	6.4
Paestum	city	4 AD	14.8
Naples, Sta. Maria	city	6 AD	18.6
Herdonia	rural	2 BC–AD	5.5
Monte Gelato	rural	Late Ant	9.1
Pievina	rural	1 BC–1 AD	7
Via Gabina 10	rural	Late Ant	10.2
San Giovenale	vicus	3 BC–2 AD	22
Stufels-Hotel	vicus	1–5 AD	5
Udine	vicus	4–6 AD	6.7
Pozzuolo del Friuli	vicus	1 BC–1 AD	9.2
Montecatino	vicus	6–4 BC	12.7
Monte Gelato	vicus	4–5 AD	16
Settefinestre	villa	1 BC–4 AD	17.6
Settefinestre	villa	4–5 AD	22
Lugnano	villa	1–3 AD	46.3
Gravina	villa	2 BC–1 AD	14
Monte Barro	villa rustica	4–7 AD	12.8
Matrice	villa rustica	1–3 AD	14.7
San Giacomo	villa rustica	5 AD	16.5
Le Colonne	villa rustica	1 BC–1 AD	16.7

ican meat consumption consists of game, and among the Dutch, the figures are similar.[83] In the 19th century, however, only relatively privileged Europeans had much access to meat from domesticated livestock,[84] and game meat was exceedingly rare.[85] In Liguria, for example, the hunting and consumption of wild boar had completely disappeared in the 19th century, and was only reintroduced, on a small scale, in the 1960s.[86]

83 See Krostitz (1979); Luxmoore (1989); Bolger (1994); Kron (2008b, 188).

84 Kron (2008a, 81–82).

85 See Fletcher (1989, 324); Kron (2008a, 185–186).

86 Hearn (2013).

TABLE 5.7 *Prices of game meat (Diocletian's price edict)*

Common name	Type	Value (price edict)	Reference	Typical weight (kg)	Price (HS per Roman lb.)
Chicken		15 denarii	4.23	2	2.4
Greylag goose	fattened	200 denarii	4.21–2		
Greylag goose	wild	100 denarii	4.21–2	7	9.3
Mallard duck		20 denarii	4.29	1.5	4.4
Rock dove		12 denarii	4.29	0.59	6.7
Wood pigeon		10 denarii	4.28	0.34	9.6
Grey partridge		30 denarii	4.24	0.34	28.9
Starling		20 denarii	4.42	0.85	7.7
Blackbird		10 for 20 denarii	4.41	0.05	13.0
Song thrush		10 for 60 denarii	4.27	0.07	28.0
Peacock	male	300 denarii	4.39–40	4–6	16.4
Peacock	female	200 denarii	4.39–40	2.75–4	16.4
Turtle dove	fattened	16 denarii	4.25–6		
Turtle dove	wild	12 denarii	4.25–6	0.14	28
Ring-neck pheasant	fattened (M)	250 denarii	4.17–8		
Ring-neck pheasant	wild (M)	125 denarii	4.17–8	1–2	20.4
Ring-neck pheasant	fattened (F)	200 denarii	4.19–20		
Ring-neck pheasant	wild (F)	100 denarii	4.19–20	0.9–1.5	21.8
Figpecker		10 for 40 denarii	4.36	0.019	6.9

Ancient game farming, however, seems to have led to a significant increase in the supply of wild game, reducing its cost until it fell within the means of the *plebs media*, and eventually of many ordinary Romans. As we can see from table 5.7, game farming soon produced pigeons, ducks, and geese as affordable as the cheapest red meats, mutton and beef; venison as inexpensive as pork, and peacock and wild boar as cheap as lamb, kid or suckling pig.[87] The song thrush, partridge and turtle dove, harder to breed and normally caught in the wild and fattened in captivity, were significantly more expensive, as one can see, but not prohibitively so, at least as an occasional luxury.

87 By way of comparison, the beef and mutton was 8 HS per Roman pound, pork, 12 HS, and lamb and kid 16 HS.

TABLE 5.8 *Kitchen refuse from Insula 30, Augusta Raurica (after Schibler et al. (1988 80–92; 156))*

Common name	Scientific name	NISP
Chicken	*Gallus domesticus*	664
Fish	*Pisces*	526
Hare	*Lepus europaeus*	436
Blackbird	*Turdus merula*	88
Frog	*Anura sp.*	64
Grey partridge	*Perdix perdix*	54
Greylag goose	*Anser domesticus*	31
Thrush	*Turdus sp.*	21
Woodcock	*Scolopax rusticola*	7
Duck (tame)	*Anas domesticus*	5
Pigeon	*Columba domesticus*	3
Starling	*Sturnus vulgaris*	1
Ring-neck pheasant	*Phasianus colchicus*	1
Goosander	*Mergus merganser*	1
Nightingale	*Luscinia megarhynchos*	1
Great grey shrike	*Lanius excubitor*	1
Hawfinch	*Coccothraustes coccothraustes*	1
Gerganey	*Anas querquedula*	1

The Swiss team which excavated Augusta Raurica has done a superb job in comprehensively studying the animal bones and placing them clearly in their social context.[88] The poorer areas of the town tend to eat beef and mutton, with 90 % of the refuse from a taverna coming from beef bones, for example,[89] while pork, domestic fowl, fish, and wild game dominate the wealthier and more Romanized quarters, such as Insula 30, the source of a substantial deposit of kitchen refuse described in table 5.8, above.

Martial offers many poems highlighting the appetite for wild game and other exotic foods among the contemporary public,[90] but his description of the idyllic world of a Roman farm, a true working farm rather than a suburban

88 Schibler et al. (1988).

89 Schibler et al. (1988, *passim*); Deschler-Erb (1992).

90 Martial lists a wide range of gamebirds among his list of possible saturnalia gifts, including the song thrush (13.51 and 13.92); duck (13.52); peacock (13.70); woodcock (13.76); rockdove

showpiece, still stocked with an incredible variety of wild and domestic fowl, offers a fitting summation of the diversification and intensification of Roman farming at its best: "Our Faustinus's villa at Baiae is not set off with fancy myrtle groves. Its wide fields give no unnecessary space to barren plane trees or clipped box hedge. Its wealth is truly and barbarously rustic. Generous Ceres stuffs every corner. Many a wine jar breathes ancient vintages, and the hairy vine-pruner brings in the late grapes in November, when midwinter is on its way … His dirty barnyard birds range free—noisy geese, bejewelled peacocks, flame-wing flamingoes, painted partridge, speckled Numidians, pheasant from impious Colchis. Proud cocks tread Rhodian hens. His towers resound with the beating wings of doves and the cries, here of wood-pigeons, there of turtle-doves."[91]

5 Conclusion

Although most attention, both from our ancient sources and from modern archaeological fieldwork, has concentrated on the most sophisticated techniques of Rome's wealthiest farmers, and their best-appointed luxury villas, agricultural production in Roman Italy was always carried out primarily by small and medium-scale family farmers, both as owner-occupiers and *coloni*. As Cato's invaluable handbook illustrates, the villas of the equestrian and senatorial elite, far from being a radical innovation, were built on the foundation of traditional Roman intensive mixed farming, simply carried out on a somewhat larger scale with the help of slave and hired labour. Moreover, Cato, like all the Roman agronomists, is very conscious that owners of large villas need to integrate themselves into a broader rural community of small farmers, whose knowledge of the local environment and farming techniques, of local markets and suppliers, and whose as potential value as tenant farmers and skilled labour could be extremely helpful. The archaeological remains of small farmhouses confirm the impression left by Cato of his heavy debt to traditional farming practices on small family farms. The determination of small farmers to expand their farmsteads, including investment in wine and olive presses, accommodation for livestock, and storerooms for agricultural produce and *instrumentum*

(13.66); grey partridge (13.61, 65 and 76); stork (13.75); pheasant (13.72); guinea fowl (13.45.1 and 13.73); figpecker (13.49); purple gallinule or swamphen (13.78); and the flamingo, of which Martial declares: "Flamingoes: My ruddy wing gives me a name, but my tongue is a treat to epicures. What if my tongue were to tell tales?" (13.71).

91 Martial 3.58.

fundi, all suggest that the intensive mixed farming oriented to urban markets which we associate with the Catonian villa should be associated with a much wider range of farm operations. The prosperity which these small farmers attained is evident not only from the expansion of their farmsteads, however, but from their investment in mosaic pavements and fresco decoration, as well as the impressive size of many of these buildings, ranging from 150–200 m^2 up to a large cluster of medium-sized farmsteads of 450–500 m^2.

Just as wealthy farmers like Cato, Varro and Columella were conscious of what they could learn from their neighbours, with their broader, often international, perspective on farming, and greater access to capital and ability to take risks, they also played an important role, both by example, and, in some cases, through agricultural manuals, in introducing small farmers to new farming techniques, improved breeds of livestock and wild game, and new crops and fodder plants. We have examined just one example, game farming, showing how the raising of initially expensive and exotic game species was introduced by a pioneering generation of equites, senators and consulars, men like Lucullus, Seius and Axius, in the late Republic, opening up new markets and demand and gradually perfecting the requisite agricultural techniques. But while these prominent Roman farmers began by serving a luxury market, they wisely realized the importance of democratizing the taste for game meat and the ability to raise it. Both would eventually expand until game was very nearly as affordable, and as widely eaten, as many types of domestic livestock, and late antique agricultural manuals would include instructions on raising game birds with their advice on keeping common barnyard fowl like chickens, ducks and geese. Yet a similar path towards greater intensification of agriculture can be assumed in many other branches of farming, less easily documented with archaeological evidence, in which Italy's family farmers were able to adapt the innovations of wealthy experts in Hellenistic and Carthaginian scientific agronomy in order to meet the demands of affluent urban (and rural) markets for the finest food at a reasonable price.

Appendix 1. Sample of Excavated Small Farmsteads

Name	Reference	Area	Roofed	Rooms	Dolia	Press	Decor
Posta Crusta	De Boe (1975); Rathbone (2008, 315–316)	399		13	13	Y	Y
Boscoreale Giuliana I	Rathbone (2008, 318–319)	180					
Boscoreale Giuliana II	Rathbone (2008, 318–319)	530				Y	
Villa Maricigliana	Marzano (2007, 508 fig. L225)	144+				Y	
Villa S. Basilio	Marzano (2007, 534 fig. L239); De Franceschini (2005, no. 35)	668					Y
Villa on Via Polienza	Marzano (2007, 554 fig. I.255)	155					
Site 10 on Via Gabina	Marzano (2007, 642–643 fig. I.372)	419		6			
Farm at Fossa Nera 'A'	Ghisleni et al. (2011, 138 note 25); Ciampoltrini (2004b)	284					
Farm at Lugugnana	Ghisleni et al. (2011, 138 note 25); Ciampoltrini (2004b)	225+		9			
Farm at Legnano I	Busana (2001, 510–511 no. 6 and fig. 2)	57		2			
Farm at Legnano II	Busana (2001, 510–511 no. 6 and fig. 2)	160		7			
Farm at S. Pietro in Carmiano I	Busana (2001: 510–511 no. 5 and fig. 1)	13.4		1			
Farm at S. Pietro in Carmiano II	Busana (2001, 510–511 no. 5 and fig. 1)	129		5			
Poggio Bacherina	Torelli (2012, 23 fig. 1.12)	274		7+			
Villa at Sambuco	Torelli (2012, 23 fig. 1.11)	380		11			
Villa at Mancamasone I	Torelli (2012, 22 fig. 1.10)	131		8			
Villa at Mancamasone II	Torelli (2012, 22 fig. 1.10)	537		14			
Villa rustica at Francolise	Torelli (2012, 21 fig. 1.8)	348		6			
Lucanian farm at Molvone di Tolve I	Torelli (2012, 20 fig. 1.6); after Russo (1993, fig. 64)	195	138	5			
Lucanian farm at Montegiordano	Torelli (2012, 18 fig. 1.5); after Guzzo (1990, 325)	487		8		Y	
Villa rustica at Boscoreale (38)	Adams (2012, 309 fig. 102); after Sogliano (1897)	490	435				

Name	Reference	Area	Roofed	Rooms	Dolia	Press	Decor
Posto villa	Adams (2012, 277 fig. 38)	155			1	Y	
Villa of L. Aurelius Successus	Adams (2012, 277 fig. 38)	164					
Villa rustica no. 33	Carrington (1931, 120 fig. 16)	632	584		35		Y
Villa rustica no. 34	Carrington (1931, 120 fig. 16)		857				
Villa rustica no. 22	Adams (2012: 304 fig. 92); Carrington (1931, no. 22); after Paribeni (1903)	511.5					Y
Campanian villa rustica no. 27 (Carrington)	Adams (2012, 308 fig. 100); Carrington (1931, 120 fig. 16 no. 27)	547.5	306				Y
Villa rustica at Boscoreale (31)	Adams (2012, 302 fig. 88); after Della Corte (1921)	330					
Villa rustica at Boscoreale (32)	Adams (2012: 303 fig. 90); after Della Corte (1921); Carrington (1931, no. 28)	530					
Villa at Dragoncello	Adams (2012, 259 fig. 2); after Pellegrino (1983)	887.5		24	30		
Villa rustica at Boscoreale (30)	Adams (2012, 301 fig. 86); after Della Corte (1921); (Carrington 1931, no. 26)	540.6		15	5		
Villa rustica at Boscoreale (25)	Adams (2012, 296 fig. 76); after Della Corte (1921)	257					
Villa of Popidius Florus	Adams (2012, 295 fig. 74); after Della Corte (1921)	527		21			
Villa of Domitius Auctus	Adams (2012, 311 fig. 106); after Sogliano (1899)	359		15	6		
Villa at Carmiano	Adams (2012, 329 fig. 142); after Camardo and Ferrara (1989)	410		14	12		
Villa rustica at Boscoreale (39)	Adams (2012, 310 fig. 104); after Sogliano (1898)	180		10	4		
Villa of Crapolla at Scafati	Adams (2012, 312 figure 108)	210		15	4		
Villa Regina at Boscoreale I	De Caro (1994); Adams (2012, 306 fig. 96); Rathbone (2008, 317–318)	240		2 or 3			

(cont.)

Name	Reference	Area	Roofed	Rooms	Dolia	Press	Decor
Villa Regina at Boscoreale II	De Caro (1994); Adams (2012, 306 fig. 96); Rathbone (2008, 317–318)	450		7	18		Y
Giardino Vecchio	Rathbone (2008, 315–316)	500+		20?		Y	Y
Site 9 Farmstead	Rathbone (2008, 313–314)	150+					
Nocelli farm	Rathbone (2008, 312–313)	150					
Site 154 Monte Forco ridge	Rathbone (2008, 311–312); Jones (1963, 149–155)	55					
Farm at San Biagio	Giardino (2012)	247					
Farm at Montalbano I	Giardino (2012, fig. 1.3)	490	317.5	12	5		
Farm at Montalbano II	Giardino (2012, fig. 1.3)	630	457.5	14	5		
Farm at Sant'Angelo Grieco I	Giardino (2012, fig. 1.4)	33					
Farm at Sant'Angelo Grieco II	Giardino (2012, fig. 1.4)	137					
Farm at Masseria Durante I	Giardino (2012, fig. 1.5)	138		1			
Farm at Masseria Durante II	Giardino (2012, fig. 1.5)	435.6		4 (?)			
Farm at Masseria Durante III	Giardino (2012, fig. 1.5)	534.8		8 (?)			
Fattoria Fabrizio	Oome and Attema (2008, 633); after Carter (2006, 139, fig. 4.3 and 4.4)	148.3		9			
Fattoria Stefan	Oome and Attema (2008, 634 fig. 23); after Carter (2006, 144–145, fig. 4.13 and 4.14)	298	270	10			
San Rocco Villa I	Blanckenhagen et al. (1965, 58 fig. 2)	415					
Fattoria at Pantanello Sanctuary	Oome and Attema (2008, 635 fig. 24); after Carter (2006, 170–171, fig. 4.42 and 4.43)	116.5					
Auditorium villa I	Terrenato (2001a, 8 fig. 3)	266.3		10			
Auditorium villa III	Terrenato (2001a, 10 fig. 7)	773	587	14			

CHAPTER 6

Modelling Crop-Selection in Roman Italy. The Economics of Agricultural Decision Making in a Globalizing Economy

Frits Heinrich

1 Introduction

Over the past decades, the Roman economy debate has moved away from the primitivist model of a stagnant and unchanging economy. While the measure of Roman economic success (and how to measure it) as well as the nature and extent of economic growth are still hotly debated, there is now a general consensus that change did indeed occur.[1] For instance, time series analyses of various archaeological material groups, which serve as economic proxies, suggest a period of increased economic activity between the 1st century BC and the mid-2nd century AD.[2] In addition, other parameters, such as demography and the level of urbanization, seem to exhibit increases congruent with this pattern.[3] Various institutional and other qualitative changes in the economic landscape took place simultaneously with these developments. Of these developments arguably the most important, as well as a likely instigator of many changes itself, was the emergence of an increasingly integrated 'single market' and a globalized economy following Rome's political unification of the wider Mediterranean.[4]

The present volume is devoted to the effects on and responses of rural communities in Italy to these changes and to becoming a part of this Roman global economic system. If more goods were consumed as the time series suggest, it follows that more goods needed to be produced. The most important sector of the rural economy by far (and of the Roman economy in general) was agriculture. Not only was everyone dependent on agriculture for their food, clothing

1 For an overview of the debate see for instance Jongman (2007a); Scheidel (2009); Wilson (2009b); Attema and Jongman (2010); Jongman (this volume).

2 For discussion on time series of Roman economic proxies see Jongman (2007a); Attema and Jongman (2010); Jongman (2014).

3 Cf. Scheidel (2007a).

4 Cf. Horden and Purcell (2000).

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and fuel, the majority of the population obtained their income through agriculture one way or another, and almost all non-agricultural production chains relied on agriculture to supply raw materials. Therefore, the need to produce more would have been felt strongest here. Agriculture's centrality would have also ensured that any major development in the economic landscape would have had serious repercussions for agricultural production and individual producers, thus eliciting some sort of response. Sprawling urbanization and economic globalization with its improved market access and market integration, for instance, could have created incentive and provided opportunity for Italians entering new markets, while on the other hand more competitors could enter the Italian market.

In this paper I will assess how Italy becoming the centre of a globalized and growing Roman economy affected the crop choices of Italian rural communities. I will focus on cereal cultivation and the shifts in crop-selection within this crop category. Cereals were the main staple of the Roman diet and the most important crop category in the Roman Empire as they have been in virtually any society that practised agriculture since the Neolithic Revolution, including our own. Cereals are a far less homogenous group of crops than they may seem; there are many species and subspecies, each with its own requirements and performance parameters. These qualities largely determine the required inputs and achievable outputs of the production process and the suitability of the crop for environmental and economic conditions. Therefore, for farmers these qualities represent 'selection criteria'. Examples include requirements in terms of water use, climate and soil fertility, but also disease and predation resistance, ease of processing, transportability, storability and yield. Additionally, their suitability for producing different consumer products (e.g. porridge or leavened or unleavened bread), their nutritional qualities, consumer appreciation and therefore price (e.g. wheats being more preferred and therefore a more expensive good than barley throughout much of history) and the 'secondary' products they provide (e.g. stalks suitable for thatching in the case of einkorn wheat and rye, or copious amounts of easily collected chaff that can serve as mud-brick or dung-cake temper in the case of naked wheats) may differ. The farmer will determine which of the qualities are relevant and advantageous for his situation. Therefore, the choice to select one or more cereals for cultivation is not a random or trivial occurrence. In fact, crop-selection is at the centre of agricultural decision-making. Crop choice is both a reflection of the conditions the farmer is facing as well as a determinant of almost every subsequent aspect of production and consumption.

At the same time, it is the aspect of the production process over which the farmer can exert the greatest control. Most other elements of agricultural

decision-making are far more limited by external factors, be they economic, technological or environmental, over which the farmer can exert little control. Climatic and hydrological conditions, market prices, tax regimes, government policies and the level of technology cannot be changed by the farmer, while the capital to buy more land or invest in improving its potential (e.g. by manuring and marling or constructing irrigation systems) or to purchase productivity enhancing equipment (if available and accessible) is often limited. The same goes for a shift towards agricultural activities that require a large capital investment such as wine or olive oil production; even if this is opportune due to economic conditions, the investment is probably prohibitively large for most farmers. Within the limits of environmental constraints, the farmer can much more easily shift from one cereal to another or alter the relative dominance between the cereals he already grows. All cereals that will be discussed in this paper had become standard elements of the Italian farming curriculum long before the Roman period and were easily available. The costs of a crop shift would have been modest: some additional processing steps and simple tools are necessary only when moving from a naked cereal to a hulled cereal.[5] However, the returns on a crop shift can be substantial and allow the farmer to adapt to outside stress or opportunities by reorganizing his production factors more efficiently and in line with the new realities without significant investment or innovation: be they economic growth or decline or increased or decreased market access.[6]

The advantage of studying crop-selection over many other coping mechanisms and farmers' responses to change is that, in principle, it is visible through (macro-)archaeobotanical data. These data have been collected for decades or even longer in many areas and hence are a readily available resource.[7] In past assessments of crop choice in Roman Italy and the wider Roman Mediterranean, archaeobotanical data played a minor role at best due to the limited availability of published studies. Therefore, most arguments were mainly based on written sources. Some scholars argued that though a diverse spectrum of

5 Notably, as I will point out below, the development seems to have been the reverse: from hulled to naked wheats, meaning that fewer processing steps and tools would have been required.

6 Any 'demographic' effects of a shift in crop choice by itself are limited and ultimately wear off. The premise of crop-selection is that through it farmers can adapt to new conditions to a degree, giving them more resilience rather than being an instrument of continuous innovation or an engine behind economic growth.

7 (Macro-)Archaeobotany is the study of ancient fruits and seeds. In this paper I will not deal with micro-archaeobotany or palynology, which is the study of pollen.

cereals was, and continued to be cultivated in Italy, the long term trend was a move away from hulled to naked wheats. In particular, the shift from emmer wheat to hard wheat, which such authors claimed could also be observed elsewhere in the Mediterranean, was emphasized. Others argued instead that Italian cereal cultivation remained diverse without any (sub)species acquiring significant dominance.

In the present paper my aim is to ascertain, through the assessment of the Italian archaeobotanical data, which of these views is best supported by the available evidence. Also, I will model an explanation for any apparent crop shift or lack thereof within the context of a globalizing economy. In order to do so, I will begin with a brief discussion of the historiography of the debate on crop-selection in Roman Italy and point out some parallels in adjacent areas. Subsequently I will model the choice between emmer wheat and hard wheat with the help of newly collected empirical data. I will argue that hard wheat is better suited to the demands of a globalized, market oriented economy thanks to its higher transportability and greater suitability for large scale processing and consumption, especially in urban contexts. Though an exhaustive, in depth review of all published archaeobotanical data is beyond the scope of the current paper, I have chosen a representative selection of studies to assess if there is a pattern in their data.[8]

2 Crop-Selection Models for the Roman Mediterranean: From Emmer Wheat to Hard Wheat?

Agronomist and economist Naum Jasny (1883–1967), while not explicitly using the term crop-selection model, was among the first to discuss the qualities of different cereals in detail as a factor in past agricultural decision making. Jasny compared the performance of various cereals with respect to biological factors such as climate, soil, hydrology, geology and productivity, but also gave ample thought to more economic concerns such as price and marketability. Jasny's *de facto* model of crop-selection in the ancient Mediterranean asserted that the importance of most cereal species, especially emmer wheat, diminished over time in favour of hard wheat.[9] He argued that hard wheat through gradual crop improvements had overtaken emmer wheat in terms of yield. Moreover,

8 For a discussion of additional studies and a commentary on such studies from an archaeobotanical methodological perspective see Heinrich (in preparation).

9 Jasny (1942); Jasny (1944); Jasny (1950).

he stated that hard wheat was better suited for bread making. While recognizing that hard wheat was less bulky than emmer wheat, and therefore easier to transport, Jasny believed that this aspect was only of minor consequence. Besides the importance of hard wheat, one of the main points of his argument was that the different subspecies of barley consistently remained important.[10] His greatest contributions were his application of biological plant characteristics and explicating differences between cereals. Many historical economic models treat cereals as if they are a single crop, or at least a homogeneous product. Merely distinguishing between 'wheat' and 'barley' (and sometimes 'millet') is insufficient, since economically relevant differences surface often on the subspecies level. While Jasny's argument is compelling, the quantity, geographical distribution and scope of the (archaeobotanical) data supporting it is limited.[11] Jasny argued that the shift from emmer to hard wheat was completed by Late Antiquity. Others, such as Andrew Watson, posit the completion of the process much later, in the 8th to 10th century AD.[12] The archaeobotanist Hans Helbaek also observed a shift towards hard wheat in his data. His explanation was that hard wheat first evolved in the Hellenistic period, a view that is now known to be incorrect.[13] It is often held that a shift from hulled to naked wheats took place in most of (at least southern) Europe and North Africa somewhere in the 1st millennium BC.[14]

Emilio Sereni, the famous Italian agronomist (1907–1977), was the first to construct a (*de facto*) crop-selection model specifically for Italy. Sereni observed the same shift towards hard wheat as Jasny did, but Sereni's model was more closely linked to economic and cultural performance than Jasny's 'evolutionary' model. Sereni argued that specialization occurred in periods of economic growth, while periods of decline were characterized by a greater diversity of economically relevant cereal crops. In Sereni's crop chronology, the number of cereal species with a large share in production declined from the Republican period until the Roman Imperial period, only to increase again after the fall of the Roman Empire. After the medieval period, from the Renaissance until the 20th century, the number of important species declined again as economic performance improved.[15] Sereni was also convinced of the superiority of naked wheats (such as hard wheat and bread wheat) over hulled wheats (such

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10 For a summary of his argument, see especially Jasny (1942, 760–761).

11 In particular, this is due to the limited number of published studies at the time.

12 Watson (1983).

13 Helbaek (1961, 90); cf. Sallares (1991, 350).

14 Van der Veen (2007, 985); cf. Lentjes (2013, 126).

15 Sereni (1961).

as emmer wheat and einkorn wheat). This was a notion opposed by Jasny, who argued that superiority and inferiority were situational and depended on the intended application.

Climate and geology played an important role in both Jasny's and Sereni's model. In response to Sereni, Spurr, in an essay on the importance of millet in Roman Italy (and also in his famous book on Roman arable cultivation), argued against Sereni's geological and climatic determinism in modelling crop-selection. Using similar archaeobotanical evidence, Spurr described Roman cereal cultivation as a highly diverse form of polyculture. He believed this to be at odds with the view of the Roman agricultural economy as developed and successful. In a developed and successful agricultural economy, he argued, specialization would be the logical choice. However, Spurr did not explain the discrepancy between theory and the reality he observed, other than by referring to the climatological and geological diversity of Italy as suggested by his predecessors.[16]

Robert Sallares, in his book on ancient Greek ecology, extensively applied archaeobotanical evidence to the problem of crop-selection. Sallares disagreed with Jasny's model, which he believed to be too static and too much focused on aspects of farming alone. Instead, he believed the emphasis should be on what he called exogenous economic causes. Sallares also observed the shift from hulled to naked wheats, especially hard wheat, but he explained this as a *longue durée* development of unintentional crop improvements since the Neolithic period. In the course of this process, certain less attractive traits of naked wheats (such as lower yield and smaller grain size compared to hulled wheats) had been gradually cancelled out. Sallares believed that the ancient practice of measuring the productivity per plant instead of per area unit was partially responsible for the perceived attractiveness of hard wheat. For Sallares, population pressure and demography were the most important motivators for changes in crop-selection. Sallares established that barley and hard wheat were both important throughout Greece's history, as both were well adapted to its dry climate. Because of population pressure, barley, with its higher yields, was the dominant crop in Greece during much of antiquity. After antiquity, when population levels dropped, hard wheat became dominant, which Sallares stated was the preferred commodity.[17]

More recently, archaeobotanist René Cappers worked on the issue of crop-selection. His research focuses more on constructing a general model of crop-

16 Spurr (1983 and 1986, 93–94).

17 Sallares (1991, 313–360).

selection than on trends in specific periods or regions. Central to his model are the morphological traits of crops and their relation to crop processing, an aspect previously neglected somewhat in the debate. Cappers also improved the terminology of crop-selection models. For instance, he coined the term 'selection-criteria' for aspects of a crop that make it more or less attractive within the context of farmers' circumstances. Cappers fed his model with ethnobotanical and ethnographic observations in Egypt and the Near East.[18] Analogous to Sallares' critique of Jasny's model, one could argue that Cappers' model focuses too strongly on farming and especially plant morphology while paying less attention to more economic factors such as demography, price or market integration. Another valuable contribution by Cappers is his construction of a crop-selection trend for Egypt, for which he coined the term 'crop chronology'. It was based on the assessment and evaluation of various published archaeobotanical data, and it therefore had a more solid empirical basis than the trends established by his predecessors. In later publications Cappers and his co-authors explained some crop-selection shifts in the Egyptian crop chronology (see Fig. 6.1).[19] Most importantly, and in agreement with Jasny, Sereni, Helbaek and Sallares, this crop chronology shows a shift from emmer wheat to hard wheat in the Hellenistic and Roman periods.

Cappers was able to benefit from the quality and quantity of published archaeobotanical studies on Egypt. In many other regions in the Mediterranean and the Near East, archaeobotanical research has a shorter or less developed history and published studies are scarce. However, crop chronologies can also be constructed for individual sites or groups of sites. Figure 6.2, for instance, shows a tentative crop chronology for Sardinia from the Early Neolithic to the medieval period constructed by the author of this article, using data from several Sardinian sites compiled by Bakels.[20] This graph interestingly shows the same trend that can be observed in the models above: a shift from emmer wheat to hard wheat during the Punic and Roman periods.

In her recent dissertation, Daphne Lentjes inquired into agricultural developments in Southeast Italy in the 1st millennium BC. Lentjes analysed archaeobotanical samples from different periods from various sites and placed these

18 For examples, see www.plantatlas.eu.

19 Cappers and Neef (2012); Cappers et al. (2014). The shift from emmer wheat to hard wheat during the Graeco-Roman period in Egypt had already been noted in the written sources, see for instance Thompson (1984, 368–369; 1999, 128) as well as archaeologically—e.g. Dixon (1969, 131–142)—though in that case based on a smaller amount of data; cf. Thanheiser et al. (2002, 302–303).

20 Bakels (2002).

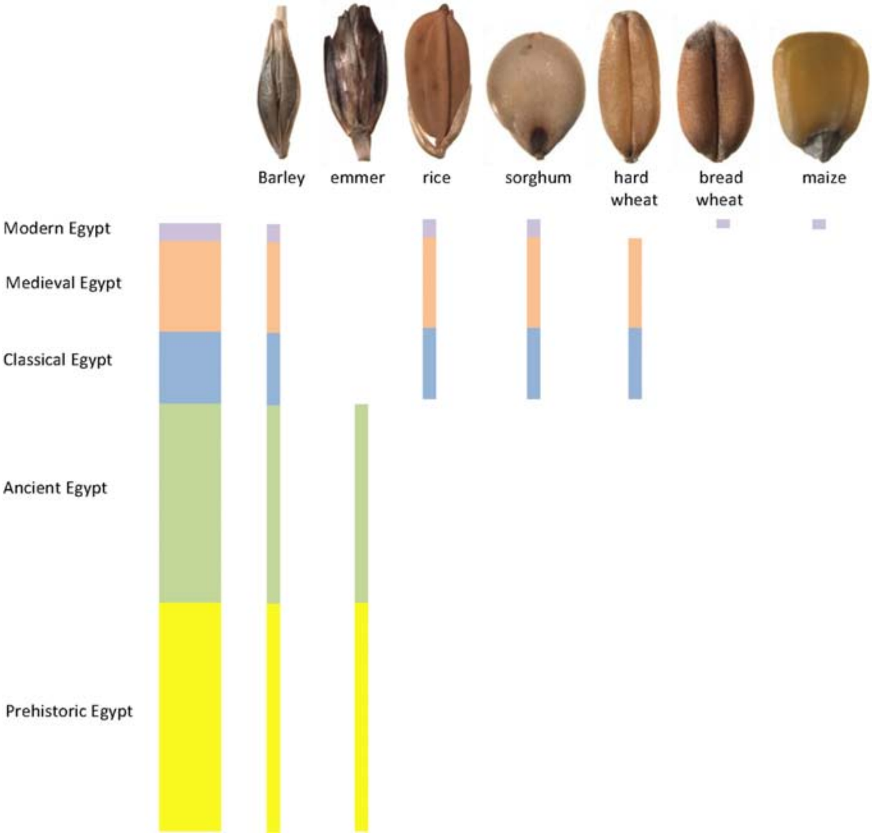


FIGURE 6.1 *Crop chronology for Egypt from the Neolithic to the present. Cappers and Neef (2012, 408); Figure courtesy of R.T.J. Cappers.*

within the context of other published studies from the area. Her most important conclusion was that over the 1st millennium BC the crop-spectrum in her region did not notably change. Some hulled cereals such as einkorn declined somewhat in importance as time progressed, but did not quite disappear, while the naked wheats became more common though not quite dominant. Interestingly, barley and wheats (both hulled and naked) were more or less of equal importance, analogous to the situation in contemporary Greece. In contrast, in the rest of Italy, wheat (in particular emmer) had replaced barley completely as dominant cereal well before the Roman unification of the peninsula.[21] Lentjes did note several important problems with respect to the quality and complete-

21 Lentjes (2013, 126–127); cf. Braun (1995, 33); White (1995, 37).

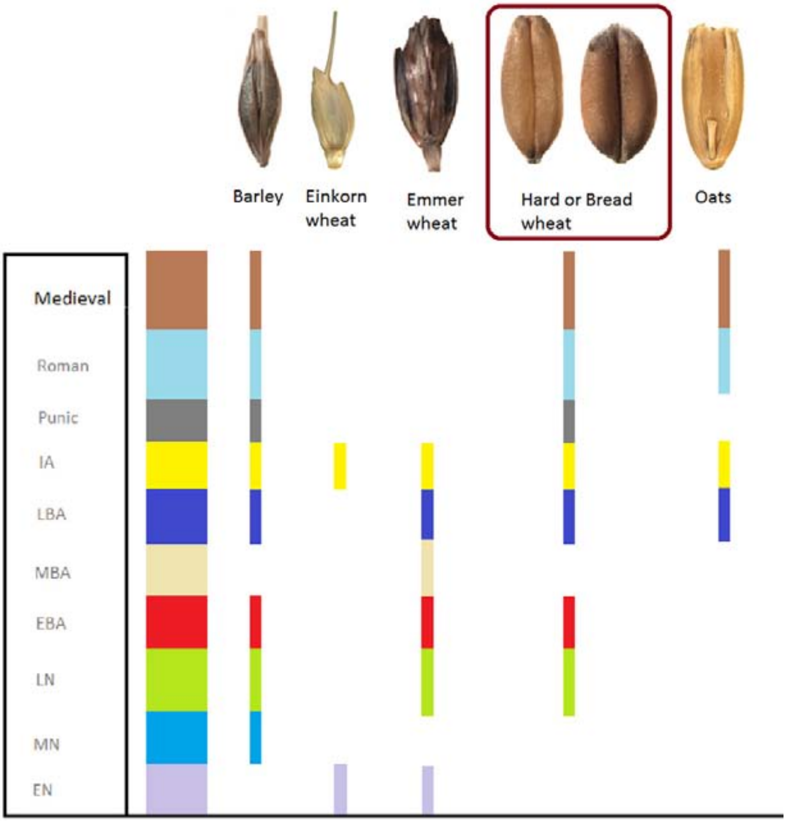


FIGURE 6.2 *Crop chronology for Sardinia from the Early Neolithic to the medieval period (Figure by the author; data after Bakels (2002, 4/6))*

ness of archaeobotanical sampling and data registration that impede the commensurability and hence comparability of the results of different studies.[22]

3 Hard Wheat Versus Emmer Wheat in a Globalizing Economy: The Trade-Off between Storability and Transportability

What, besides Jasny and Sallares' claim of greater productivity, could have been the motor behind an apparent shift from emmer wheat to hard wheat? How did the choice for hard wheat affect cereal processing and consumption?

22 She also made useful recommendations to avoid such problems in future projects; see Lentjes (2013, 226–227).

Morphologically, there are two categories of cereals: hulled and naked (or free-threshing) cereals. In hulled cereals, such as emmer wheat, the kernel is surrounded by a husk (chaff) that is firmly attached and difficult to remove, while in naked cereals like hard wheat the husk is loosely attached to the kernel and comes off during threshing. This morphological aspect has major economic implications. Post-harvest processing processes for hulled species include threshing (separating the kernels from the ear) and winnowing (a cleaning/separation process in which the threshed cereals are thrown up into the air so that the wind may blow away the waste material) followed by dehusking (removing the chaff around the kernel) and a second winnowing to get rid of the chaff. In contrast, naked cereal species only require threshing and need to be winnowed only once, removing two full steps from the production process and thus reducing labour input. In the case of free-threshing species, efficiency is further increased because the entire harvest can be processed at once. Hulled grains on the other hand are best stored in their husk and dehusked in quantities as needed for grinding/milling and food preparation, since the kernels are likely to be damaged during dehusking and are prone to spoiling once dehusked.[23] Consequently, the chaff of naked wheat becomes available in substantial quantities at once, which allows it to be used as a commodity rather than being a waste product. It was mainly used as animal fodder, a temper for mud bricks or a binder for dung cakes.[24] While not necessarily being decisive selection-criteria, secondary products may influence selection if a crop's performance is in most other respects similar. Moreover, they may provide a motive to continue to cultivate a species on a small scale alongside the main crop. Perhaps the best example of this practice is einkorn wheat, the kernel of which is inferior to that of emmer wheat but its stalks make excellent thatch. This could explain its continued co-cultivation in dry areas that lack extensive reed beds and where rye (*Secale cereale*, which also produces good stalks) cannot be cultivated.

23 K. Scherjon, miller at the traditional windmill 'De Olde Zwarver', Kampen, the Netherlands, personal comment.

24 See Bagnall (1985, 302–303) for several papyrological sources on chaff as a commodity taxed in kind. Cf. O.Mich.inv.9988 and O.Mich.inv.9031. See Spurr (1986, 78) for an overview of other uses of chaff and Van der Veen (1999) for an archaeobotanical discussion of chaff use.

TABLE 6.1 *Weight per volume for various hulled, hulled but dehusked, and naked cereals (data by the author)*

Species	Origin	Processing method	Weight of 100 ml of kernels in g	Weight of 1 liter in kg	Weight of 1 modius in kg
Hulled					
Spelt wheat	Raalte, Netherlands	N/A	39	0.39	3.40
Emmer wheat ('white')	Raalte, Netherlands	N/A	39	0.39	3.40
Emmer wheat ('red')	Garnwerd, Netherlands	N/A	41	0.41	3.58
Oat	Netherlands	N/A	56	0.56	4.89
2-Row barley	Leens, Netherlands	N/A	56	0.56	4.89
2-Row barley	El Kharga, Egypt	N/A	70	0.7	6.11
6-Row barley	El Fayum, Egypt	N/A	55	0.55	4.80
6-Row barley	El Kharga, Egypt	N/A	59	0.59	5.15
6-Row barley	Leens, Netherlands	N/A	60	0.6	5.24
Hulled (dehusked)					
Emmer wheat ('white')	Raalte, Netherlands	manually dehusked	60	0.6	5.24
Oat	Netherlands	manually dehusked	65	0.65	5.67
Spelt wheat	Germany	mechanically polished	79	0.79	6.90
6-Row barley	Groningen, Netherlands	mechanically polished	85	0.85	7.42
Naked					
Bread wheat	Yde, Netherlands	N/A	73	0.73	6.37
Bread wheat	Netherlands	N/A	80	0.8	6.98
Durum wheat	El Giza, Egypt	N/A	81	0.81	7.07
Durum wheat	Dimicri, Turkey	N/A	82	0.82	7.16
2-Row barley	Antigua, Guatemala	N/A	85	0.85	7.42

FIGURE 6.3
The threshing products of emmer wheat and hard wheat. Upper left: a floret of emmer wheat consisting of two kernels in their inedible chaff after threshing, but prior to dehusking. This is the state in which emmer wheat was normally transported. Lower left: two kernels of emmer wheat after dehusking and winnowing; this material is ready for grinding/milling and food preparation. Right: a kernel of hard wheat after threshing. With naked cereals such as hard wheat, dehusking is unnecessary as the chaff easily comes off during threshing. The chaff therefore also does not have to be transported to the consumer and the kernel is ready for grinding/milling and food preparation immediately after threshing.

The morphological difference between hulled and naked wheat has another major consequence: the threshing products of the two types differ in weight and volume/compactness, as is apparent in Figure 6.3. Although this factor has long been known,[25] its magnitude had not yet been established. Therefore, I conducted a series of morphological measurements on threshed cereals from various localities, which I manually dehusked (see Table 6.1). The results show that naked wheats have up to 43 % more weight per volume than hulled wheats. Even if only 35 % more mass per volume unit is assumed (a conservative estimate) this still results in a difference of 3 kg per *modius* or of 13.2 kg per

25 Jasny (1942), who argued this only had a very limited effect on the volume; Spurr (1986, 56) concludes this deductively, but he also applies his logic—erroneously—to hulled barley. Cf. Sallares (1991, 313–316 and 333–360) who bases himself on Pliny. Pliny was well aware of the variability in the weight of different wheats (*Nat. Hist.* XVIII 9–12). Since Pliny's classification is more concerned with topography than taxonomy, he collates information that we would distinguish as species, subspecies and landraces. However, he does note that emmer wheat is 'lighter' than *triticum* (the term in the text rather than the current taxonomic term), which may be referring to hard wheat specifically, any naked wheat or dehusked hulled wheat more generally (for a more detailed discussion, see Jasny (1944)).

TABLE 6.2 *Proportional inedible volume per unit for various hulled and naked cereal species (data by the author). As naked cereals are edible in their entirety, no measurement was required. Experiments have shown that in the case of hulled barley (either 2-Row or 6-Row) removing the husk before consumption is optional, not necessary (see Cappers et al. (2014)).*

Species	**Origin**	**Remaining volume in ml after dehusking (if required) 100 ml**	**Inedible volume (i.e. wasted transport space)**
Hulled			
6-Row Barley (hulled)	Leens, Netherlands	75 or 100	25% or 0%
Oat	Netherlands	70	30%
Emmer wheat ('white')	Raalte, Netherlands	50	50%
Emmer wheat ('red')	Garnwerd, Netherlands	49.5	50.5%
Spelt wheat	Raalte, Netherlands	46	54%
Naked			
Barley (naked)	N/A	100	0%
Rye	N/A	100	0%
Durum wheat	N/A	100	0%
Bread wheat	N/A	100	0%

artaba. Furthermore, it is important to note that not the entire volume of hulled wheat is edible; the husks will have to be removed and disposed of prior to consumption. In order to avoid spoilage during transport, however, they are normally left on and are still part of the load that has to be transported to the consumer. In emmer wheat, c. 50% of the volume consists of chaff, against 0% in hard wheat. It should be noted that barley has similar advantages (Table 6.2).

The calculations presented in Tables 6.3 and 6.4 illustrate the significance of these differences.[26] Interestingly, the shift from emmer to hard wheat in Egypt and on Sardinia coincided with the Hellenistic/Roman era, a period

26 The data presented in Table 6.1 and Table 6.2 also have implications for the use of grain prices by economic historians who want to compare incomes and prices or calculate inflation, since in many written sources a generic word for wheat or grain is used and the exact (sub)species identification is unclear. Two brief examples will illustrate this.

TABLE 6.3 *Sample calculation applying the data on emmer wheat and durum wheat from table 6.2 to a 50,000* modius *freighter. Note that it is highly unlikely that emmer wheat was dehusked prior to transport.*

50,000 *modius* freigther	**Edible volume in *modii***	**Edible volume in L**	**Weight of 1 L of edible volume in g**	**Weight of entire edible volume in kg**	***n* consumers fed at 250 kg p.p. p/a**
Emmer wheat	25,000	218,250	600	130,950	523
Emmer wheat (dehusked)	50,000	436,500	600	261,900	1,046
Durum wheat	50,000	436,500	800	349,200	1,396

when these regions (forcibly) entered upon more intensive exchange relations. The advantages of such a shift are apparent. For example, the shift to hard wheat would have greatly reduced the transport cost of shipping (tax)grain to Rome. The economics of scale also operated in the processing: if flour or meal and bread have to be provided for literally hundreds of thousands of people in a city as large as Rome, cutting out the steps of dehusking and second winnowing while reducing transport costs would pay off.[27] For large-

Kay (2014, 102–103) calculated Roman inflation using lower wheat prices provided by Polybius from Cisalpine Gaul (Polyb. 2.15.6) and Lusitania (Polyb. 34.8.7–8) and higher wheat prices from Sicily provided by Cicero 80 years later (Cic *II Verr* 3). It is not possible in either case to determine with certainty the (sub)species of wheat. However, it is not unlikely that Polybius' 'northern' grain was (hulled) emmer wheat (or another hulled wheat), while the Sicilian grain was most likely (naked) hard wheat (see sections 2 and 4). Therefore, at least part of the price difference likely results from dealing with differently valued products rather than inflation. Monson (2012, 193), using an overview of land-prices expressed in volumes of grain from 1350–620 BC compiled by Baer (1962, 25–30), concludes that land prices in Pharaonic Egypt were roughly twice as high as in Ptolemaic Egypt (12.3 artaba per aroura against 5.7 artaba per aroura). This difference all but dissipates when we take into consideration that emmer wheat was the dominant wheat in Egypt during the Pharaonic period, whereas hard wheat was the dominant wheat during the Ptolemaic period (see Fig. 6.1). For another example, see the case study by Heinrich and van Pelt (2017) on the quantification of Ramesside grain transports and grain prices.

27 There may also have been an effect on required storage space, although this would certainly not have been the primary motivation for the Roman state. Vitelli (1980, 59–62) demonstrated that the size of *horrea* in Ostia decreased over time, even before and contemporary with the apex of Rome's (re)distribution infrastructure. It is possible that

TABLE 6.4 *Sample calculation applying the data on emmer wheat and durum wheat from table 6.2 to a 500 kg cartload. Note that it is highly unlikely that emmer wheat was dehusked prior to transport.*

500 kg cart	Cargo in *modii*	Cargo in L	Edible weight of cargo in kg
Emmer wheat	144	1250	250
Emmer wheat (dehusked)	96	834	500
Durum wheat	72	625	500

scale private producers who sought to supply the markets, transport costs and labour input would have been serious considerations as well.

Different considerations applied to small farmers who were primarily interested in subsistence and risk avoidance (provided there was no taxon specific taxation in kind). Weight and volume would have mattered very little for the relatively small quantities peasant farmers had to store or transport to nearby markets as a small, perhaps occasional, marketed surplus. The household could easily provide the small amount of labour required for frequent dehusking. Moreover, the easy processing of naked wheat came at a price peasant farmers may have been unwilling to pay. Naked wheat may suffer from serious seed loss during reaping at the end of the ripening period, as part of the seeds may scatter. They must therefore be harvested close to the ground and at the beginning of the ripening season, and be allowed to after-ripe. Hulled cereals do not have this problem.[28] Increased storability (through the protective hull) due to reduced spoiling (by fungi, insects, etc.) is another advantage of hulled wheats.

The eponymous advantage of hard wheat is that it is harder than most other wheat (sub)species, which (perhaps counterintuitively) makes it easier to grind so that less energy/labour input is needed.[29] This is a minor advantage, and only when making flour; coarse meal may be used instead of flour to produce bread, which is far less labour intensive. Grinding can be avoided altogether by eating entire or crushed, boiled grains (i.e. porridge). Since it requires only a few processing steps, porridge would seem more economical than bread. For

naked wheat species became increasingly important as imports, allowing for smaller storage facilities even when in fact more cereals were being imported.

28 See Sallares (1991, 336) for various references.

29 Cf. Wilson (2009b, 79).

this reason bread often has the connotation of a luxury article that is available to civilized folk in towns and cities, while porridge is for rustics (and mythical ancestors).[30] I would argue that large-scale bread consumption was not a luxury, but a game-changing adaptation, especially in urban contexts. Instead of the fluffy loaves Americans and Europeans consume today, bread in antiquity often came in the form of (coarse) unleavened flatbread (like modern Egyptian bread, rusk, *matzos*, or *paximadi*) or hard cakes.[31] Such breads, because they are very dry, have the advantage that they can be stored for a very long time. Therefore, large quantities can be baked in one session, which reduces labour input.[32] This also has a great impact on fuel consumption, since ovens need to be heated far less often; ethnographic examples are known of villages using a shared oven only once every few months.[33] Moreover, as Veal (this volume) argues, large ovens are more fuel-efficient than small ovens. By contrast, porridge or boiled grain spoils quickly and needs to be prepared fresh in small quantities every day. As cereals need to be boiled for about an hour (crushed cereals for a shorter period), this amounts to high fuel consumption.[34] In ecological or economic contexts in which fuel is tied to land and competes with food production (i.e. any pre-modern economy), is exceptionally scarce (e.g. Egypt), or needs to be hauled in at great expense (e.g. to a large city such as Rome), this is a significant factor. One can imagine the effects on fuel demand once the State began to provide baked bread instead of sacks of grain to the populace of Rome. In rural areas where fuel was abundantly available or the population was dispersed (making resource pooling impossible), porridge may have been an equally sensible choice as bread economically speaking because of lower labour input. In (farming) villages, resource pooling and communal oven use would make the option of producing large quantities of flat-breads feasible and attractive.[35] The beneficial effects of this preparation mode would not have been available to the urban poor, as they neither owned large ovens

30 Cf. Wilkins and Hill (2006, 110–139).

31 Cf. Cappers et al. (2014).

32 For ethnographic photographs and films of these processes by Cappers and others, see http://www.plantatlas.eu.

33 Cappers and Neef (2012). Cf. FAO (1970).

34 This input can be significantly reduced by producing semi-finished, storable products in a fuel-efficient manner and in great quantities. Such products need to be boiled only briefly before final preparation. A good modern example is pasta, which needs to boil for about 10 minutes (cf. 60 minutes for whole kernels, above). See Cappers and Neef (2012, 248) for an ethnographic example of lumps of parboiled wheat used to make 'instant' porridge.

35 Cf. Wilkins and Hill (2006, 110–139).

nor could afford to buy a few months' worth of grain plus an ample amount of fuel at once. As specialized State and commercial bakeries were able to utilize these advantages, urbanites could still obtain relatively cheap bread (in contrast, centralized porridge production would be unpractical). Such breads could even be (the preferred) 'fluffy' loaves as a continuous and large demand made long-term storage unnecessary and spoilage less of an issue in the urban context.

This brings us to a final difference between emmer wheat and hard wheat: the average gluten content is higher in the latter than in the former (but not as high as in bread wheat). Gluten are a cereal protein that is largely responsible for giving loaves their (often desired) airy and fluffy structure and increase volume.[36] Gluten are not relevant in porridge, while in flat breads and hard cakes intended for longer storage the fluffier and softer consistency they cause may be perceived as a disadvantage. If bread does not need to be stored, however, gluten allow for the production of the often preferred softer consistency, signifying perhaps more of an added advantage than a primary selection motivator.

Overall, these arguments may partially explain why mythical, early period and rural Romans ate porridge while their villager and urbanite descendants ate flat emmer wheat or somewhat fluffy hard wheat breads respectively. Rather than different grades of luxury, they represent the most efficient economic choices at different levels of organization. The discussion above illustrates that crop-selection provides producers and consumers with opportunities for adaptation and resilience in the face of different or changing circumstances. Cereal crops are not only a 'produced commodity' providing energy and nutrients, but also an integrated part of producer and consumer strategies. This illustrates that crop-selection is a factor that should not be overlooked in economic modelling.

4 Crop-Selection in Roman Italy: The Archaeobotanical Evidence

Figures 6.4, 6.5 and 6.6 present an overview of cereal taxa present in a selection of published archaeobotanical studies from various Italian sites and site clusters. Figure 6.4 is a crop chronology from the Neolithic to the pre-Roman Iron Age based on several multi-site corpora of data. The presence of a species

36 For an in depth discussion of differences in wheat gluten, nutrition and baking performance see Heinrich (in press).

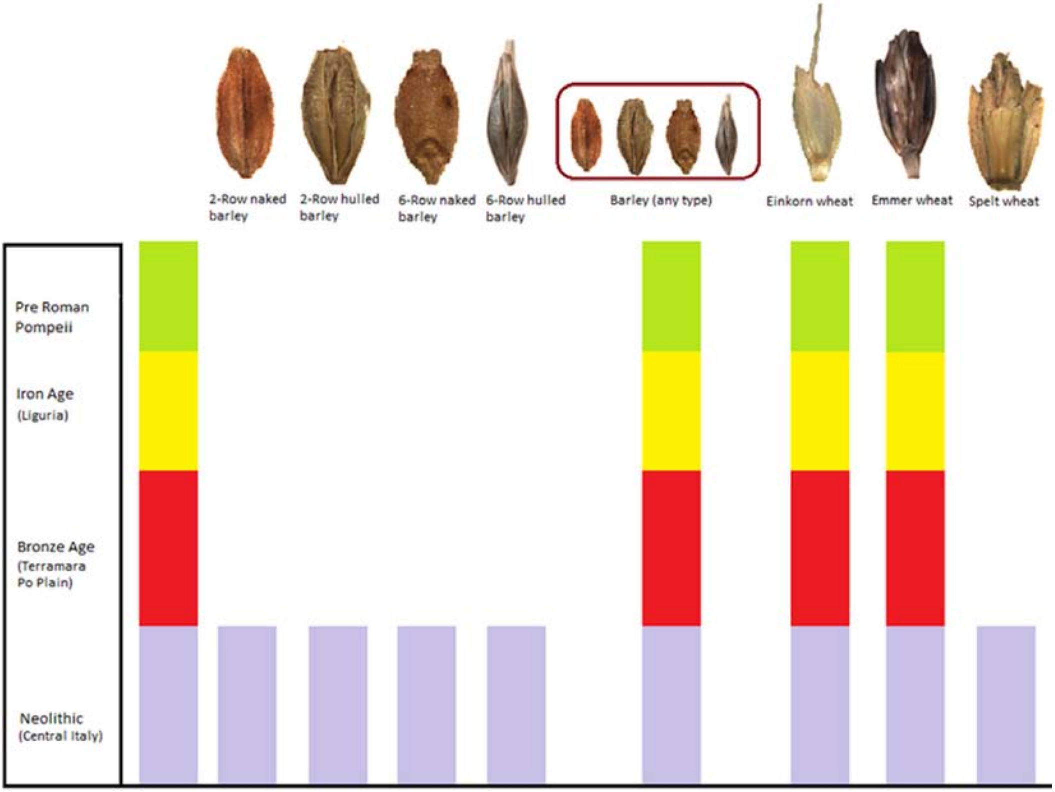
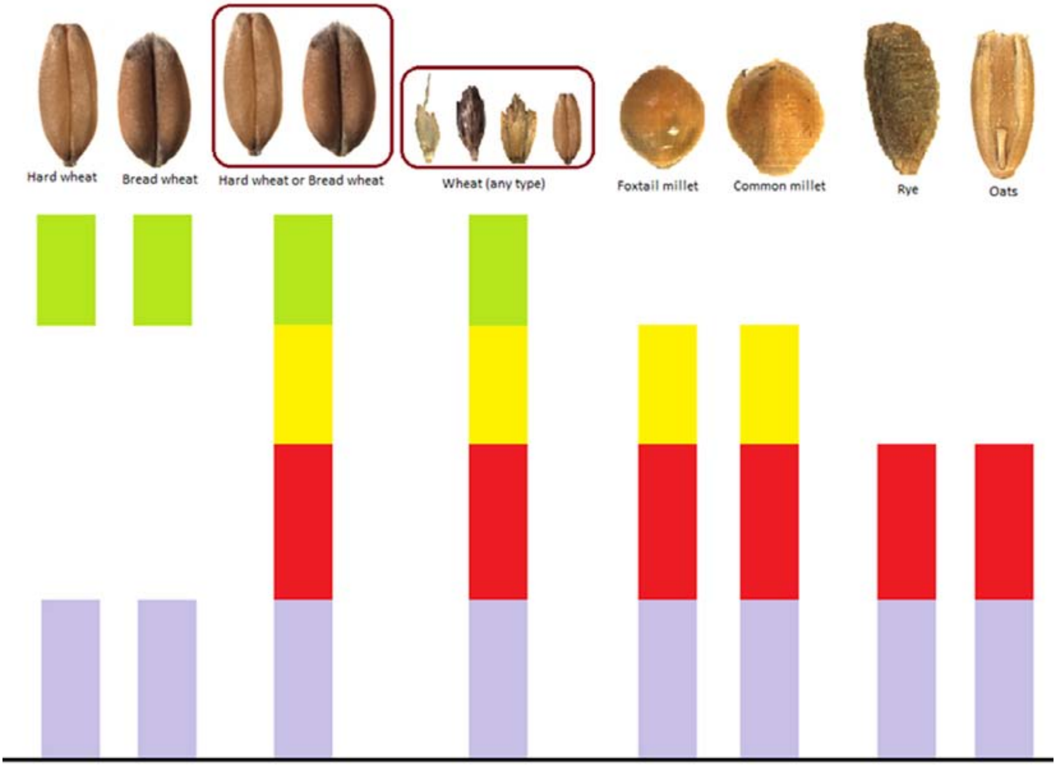


FIGURE 6.4 *Crop chronology for pre-Roman Italy from the Neolithic to the pre-Roman Iron Age, based on data from four studies with a multi-site regional archaeobotanical approach (except for the study on pre-Roman Pompeii). Neolithic data: Constantini and Stancanelli (1994); Bronze Age data: Mercuri et al. (2006); Iron Age data: Arobba et al. (2003); Pre-Roman Pompeii data: Robinson (2002).*

(top horizontal axis) in a period (vertical axis) is indicated by colour (each period has a different colour, absence is indicated by a lack of colour). Multiple items boxed together on the top horizontal axis represent uncertain identifications. Figure 6.5 is a representation of the presence or absence of species at several sites/groups of sites in Italy in the Roman period.[37] The most striking aspect of Figure 6.5 is that with the exception of rice (*Oryza sativa*), sorghum (*Sorghum bicolor*), and spelt wheat (*Triticum aestivum* ssp. *spelta*), all cereal

37 Within the constraints of this paper I did not strive to base my crop chronology on the entirety of the Italian data. Due to consistent biases (discussed below) this was also unnecessary. See Heinrich (in preparation) for a discussion of additional data.



types we know the Romans were familiar with have been attested for Roman Italy, and quite often many of them together in the same region or at the same site. Regional geological and climatic differences within Italy may account for some of the diversity. Rye (*Secale cereale*), for instance, is not well suited to the Mediterranean climate but was important in northern Italy (where all instances derive from) from at least the Iron Age onwards.[38] Spelt wheat is also better suited to the colder and wetter climates north of the Mediterranean and could only have played a role in northern Italy, if at all.[39] As the boxes 'Hard

38 E.g. Mercuri et al. (2006, 51).

39 A few uncertain cases of spelt are known from sites in the north, which were therefore identified as 'cf. *spelta*'. Some of the instances originate from research that was carried out at a time when archaeobotanists were using different identification criteria. Cf. Neef et al. (2012, xvi) for a discussion on identification criteria. A description of a type of hulled wheat with very pronounced husks and great resistance to cold is given in Pliny, *Nat. Hist.* XVIII.12; this may be a reference to spelt wheat. Pliny claims that it prevailed in Thrace,

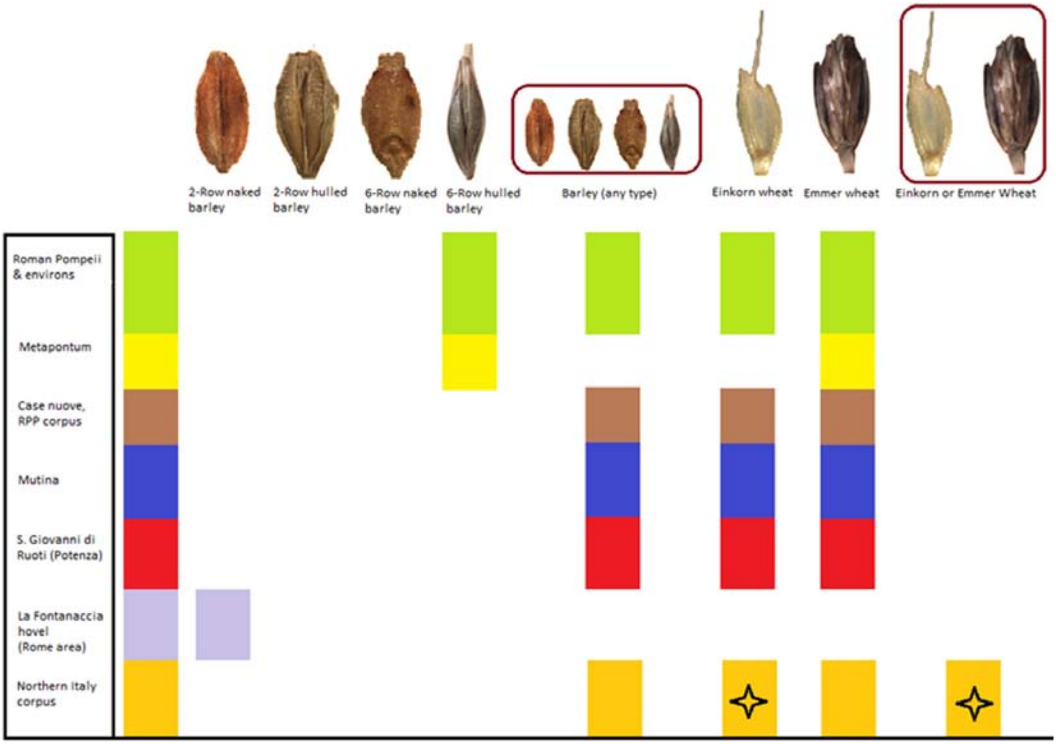
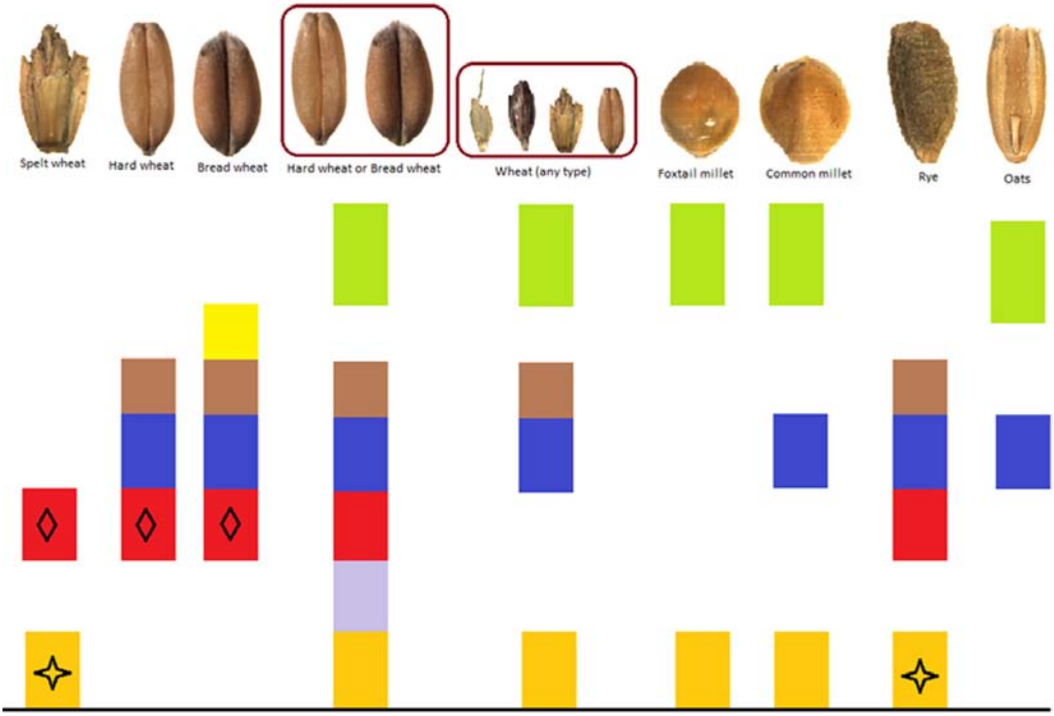


FIGURE 6.5 *'Unrefined' example of crop-selection in Roman Italy based on several studies. The stars in the data signify finds of 1 cf. specimen. (the northern Italy and Pompeiian data being based on multiple sites and/or studies). Casa Nuove RPP data: Bowes et al. (this volume), Rattighieri et al. (s.a.); Mutina data: Rinaldi et al. (2013), S. Giovanni di Ruoti data: Constantini (1983a), Metapontum data: Constantini (1983b), La Fontanaccia data: Sadori and Susanna (2005), Roman Pompeii and environs: Murphy et al. (2013), Robinson (2002), Ciaraldi (2007), Matterne and Derreumaux (2008), Meyer (1980), Jashemski and Meyer (2002), Allevato and di Pasquale (2009). Northern Italian data: Rottoli and Castiglioni (2011).*

wheat/Bread wheat' in Figures 6.5 and 6.6 illustrate, it can be difficult to distinguish between hard wheat (*Triticum turgidum ssp. durum*) and bread wheat (*Triticum aestivum ssp. aestivum*). Both species are naked wheats and require similar processing techniques and labour input. However, hard wheat performs better in drier, hotter environments, whereas bread wheat thrives in slightly cooler and wetter conditions. Today, over 70 % of Italy's hard wheat production

the Alps and the Northern provinces, but that it was also cultivated in mountainous areas in Sicily, Euboea and Achaia. No mention is made of Italy.



takes place in the south, while over 70 % of its bread wheat is produced in the north.[40] Expecting a similar division in the Roman period would be conjecture, but not necessarily unreasonable. In order to compensate somewhat for the climatic differences within Italy we can use the above assertions to split Figure 6.5 into a 'northern' (green) and 'southern' (red) crop curriculum. Hence, Figure 6.6 shows tentative crop chronologies for the north and south of Italy. The crops to the left of the vertical central bar are those that were likely most important in that region (based on ubiquity of occurrence), the crops to the right are those that were likely of secondary importance. Barley and emmer wheat are prominent in both areas, whereas millets were of secondary importance and einkorn may have played a minor role in the south. The main difference between north and south is that in the north bread wheat, supplemented by rye, was probably more important while in the south the role of dominant naked wheat was fulfilled by hard wheat.

40 Baldi (2012, 3).

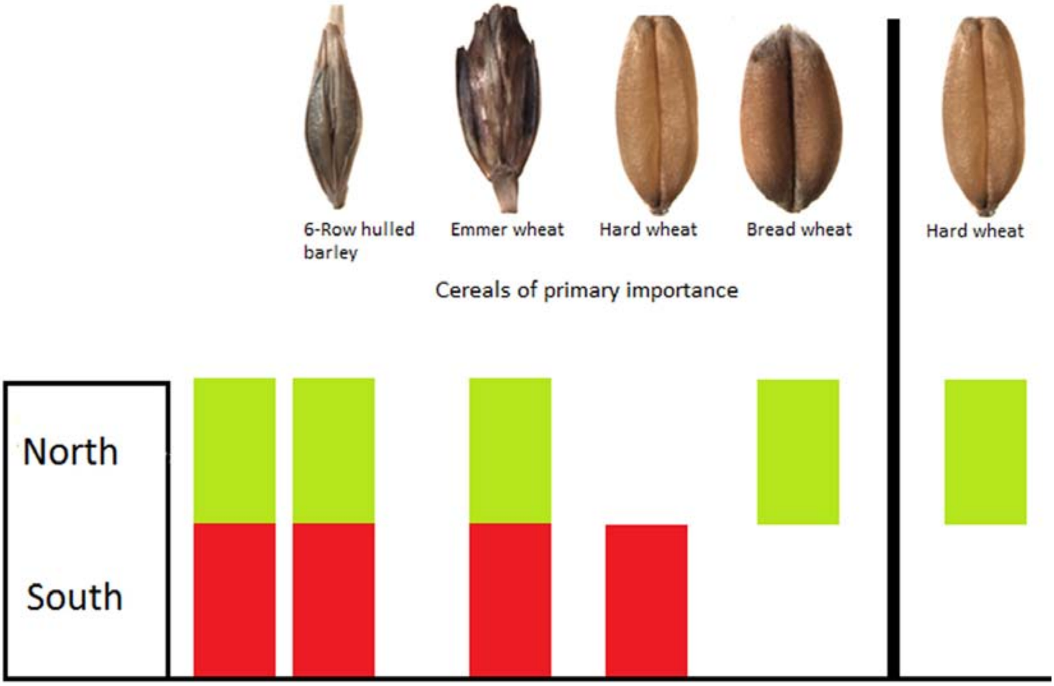
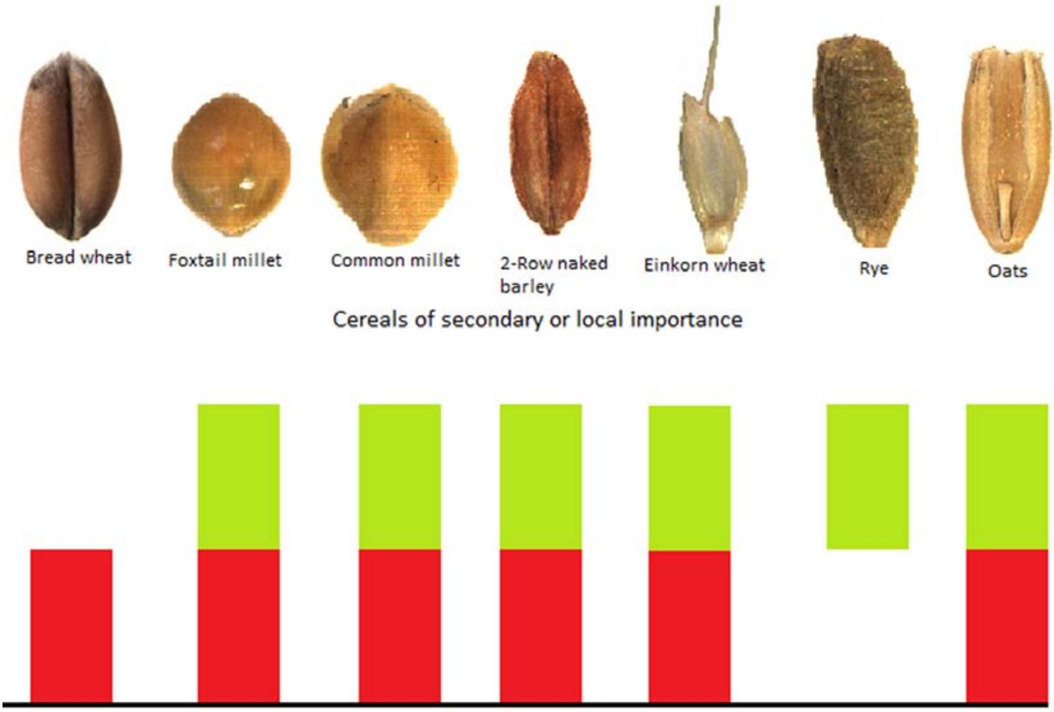


FIGURE 6.6 *Tentative generalized model of crop-selection in Roman Italy based on 'refined' data from Fig. 6.4, showing separate models for northern and southern Italy. To the left, crops of general or regional importance; to the right, crops of secondary or more localized importance.*

This apparent diversity deviates from the pattern Cappers suggested for Egypt, or what others, like Sereni and Jasny, argued happened in Italy and the wider Mediterranean. What emerges from Figures 6.5 and 6.6 is far more similar to the 'highly diverse polyculture of cereals' proposed by Spurr and the findings of Lentjes. Before we accept this conclusion, we should consider the possibility that potential biases in the data prevent us from observing patterns.

One potential bias is that archaeobotanical research in Roman Italy has been mostly focused on the urban centres rather than on rural settlements. This is a result of the methodological dichotomy between urban excavation and rural survey and the fact that macro-archaeobotanical sampling requires excavation.[41] This creates some methodological problems. Firstly, urban material, especially from major centres, is mostly related to consumption rather

41 For other, especially prehistorical Italian periods, this situation is different.



than production or processing. Processing waste from threshing or dehusking (chaff) is therefore often absent in urban assemblages.[42] However, such material is indispensable to distinguish between charred hard wheat and bread wheat kernels,[43] and subsequently we cannot make this distinction in most cases. In addition, archaeobotanical material associated with urban ritual or ornamental contexts (e.g. burnt offerings, urban gardens or burial sites just outside the city) do not necessarily reflect the economic importance of the species in question but do make up a considerable number of sampled contexts. Lastly, urban archaeobotanical material is more likely to be of mixed origin than material from rural contexts and production sites. Cities obtained the foodstuffs consumed within their walls from different production units throughout their hinterlands or even from far beyond, and this may represent diagonally different crop choices. The potential effect of this bias is perhaps best illustrated by

42 Cf. Murphy et al. (2013, 416).

43 Note the change in identification of 'durum' and 'aestivum' to 'durum/aestivum' from pre-Roman to Roman Pompeii in Figures 6.4 and 6.5. It coincides with the apparent disappearance of threshing waste and processing activities from the urban environment. See Robinson (2002, 98), cf. Murphy et al. (2013, 416).

the contrast between the results from the La Fontanaccia hovel and those from Pompeii in Figure 6.5. Projects that combine rural excavation and an archaeobotanical approach such as at La Fontanaccia and the Roman Peasant Project as discussed by Bowes et al., (this volume, and in Figure 6.5)[44] are at present still scarce but will ultimately be the best method to reduce biases by creating a sufficiently large rural dataset. The considerable number of different cereals present in the results from Bowes et al.'s study, however, also suggests that the effect of this bias may be limited.

A more important problem is that many archaeobotanical studies currently available for Italy lack (proper) quantification. While absolute archaeobotanical quantification can be problematic and has only a limited interpretative value, a rudimentary quantification is necessary to establish a crop chronology. We need to be able to assess which crop was dominant, which species were of secondary importance, and which finds represent anomalies since almost always multiple species are present in small numbers. An unquantified 'presence/absence' species list gives undue gravity to minor or anomalous occurrences and obscures patterns. Identification is also not always straightforward if the material is badly preserved or looks very much alike under certain preservation conditions, as we already saw with hard and bread wheat. A similar problem may occur with einkorn wheat (*Triticum monococcon* ssp. *monococcon*) and emmer wheat (*Triticum turgidum* ssp. *dicoccon*). The main difference between those two species is that emmer generally has two grains per spikelet and einkorn has one (hence *dicoccocon* and *monococcon*), while emmer grains also tend to be larger and of better quality.[45] A poorly developed emmer kernel, however, can easily be mistaken for einkorn or be cautiously classified as 'emmer/einkorn'. It is often very difficult to identify such considerations or mistakes in published work, especially if the proposed identification is not *a priori* unreasonable and no quantification or pictures are available; hence, patterns may again be obscured.[46] An example will suffice to illustrate the potential effect of this problem. One of the archaeobotanical datasets in Figure 6.5 derives from burnt offerings from multiple northern Italian sites. The authors quantified their data well and used 'cf.' for any uncertain identifica-

44 Cf. Rattighieri et al. (2013).

45 Van Slageren (1994); Cappers et al. (2004); Cappers (2014, 241–242). Cf. Neef et al. (2012, xvi), who based on the formulation of new identification criteria, argue many previous identifications of einkorn should in fact be updated to emmer.

46 There are various other methodological and other biases and considerations that may obscure patterns in the data; however, these go beyond the scope of the current paper. For an in depth discussion, see Heinrich (in preparation).

tions (marked in Figure 6.5 by stars). Interestingly, only one potential kernel of einkorn wheat was found, against a multitude of emmer wheat kernels. Of the ten species originally identified in this study, only six remain if the 'cf.' identifications are left out; data from unquantified publications in which uncertainty is not addressed cannot be scrutinized thus. Moreover, identification criteria may also change over time; certain criteria, for instance those through which charred hard wheat and bread wheat kernels were distinguished in the past, are no longer accepted today but are still present in older literature.[47] In the S. Giovanni di Ruoti data in Figure 6.5, derived from one of these earlier studies that was also used by Spurr, I have marked the identifications that today would be considered problematic with diamonds. This leads to a reduction from eight to five cereal types present at the site. In both examples the crop spectrum is still very diverse after these corrections.

Despite some apparent biases in the data and several methodological issues, it appears that even if we compensate for these, the dominant pattern is a diverse cereal crop regime as Spurr suggested. When taking climatic limitations and preferences into consideration, we cannot greatly reduce this diversity and can much less satisfyingly explain it.

5 Explaining Crop Diversity in a Globalized Economy

We find ourselves faced with a similar predicament as Spurr, who believed that great cereal crop diversity in Italy was at odds with a developed economic system. How is a diverse crop curriculum congruent with the pressures and incentives of globalization and economic growth—and why is the Italian situation so different from the Egyptian? There are several possible answers to this question. Functional considerations, such as the application of certain cereals for different final consumer products or the occurrence of secondary products, for instance, may have played a limited role in the continued cultivation of multiple cereals.[48] However, crop choice is also only one of several strategies farmers can employ to deal with stress or opportunity. It is not inconceivable that productivity enhancing investments were a more important coping mechanism to Italian farmers than to their Egyptian counterparts. It is also possible that strategy changes affected other activities than cereal cultivation more strongly, for instance viticulture and oleiculture.

47 For a methodological discussion of identification criteria, see Neef et al. (2012, xvi).

48 For an in-depth discussion, see Heinrich (in press).

Furthermore, farmers could have pursued multiple strategies at once: a part of the arable land could be sowed with a hulled cereal in order to be subsisted upon by the household, while a different part could be devoted to the production of a naked wheat for a marketable surplus. Forbes has argued, using an ethnographic case study in 20th century Greece, that small farmers will by default aim to produce a surplus.[49] This strategy is the safest for the farmer and guarantees that his household will not starve if the harvest fails. If the harvest is good, stores can be accumulated for bad years and part of the surplus can be sold, provided there is access to a market. In Forbes' case study, the village's isolated location rendered transaction costs too high to enter the market, and unused stores would eventually go to waste.[50] If Roman globalization resulted in improved integration of many (if not all) farming communities into the market because of a reduction of transaction costs, such 'natural' surpluses could be more efficiently used.[51]

Globalization could also have allowed for a degree of Smithian specialization. Certain regions enjoy a comparative advantage in the production of certain crops, resulting in higher productivity, better-quality produce, or lower production costs (e.g. because of climate, soil, pre-existing production infrastructure or cheap labour). Roman examples include Baetica and Africa Proconsularis, both of which focused on olive oil production. Similarly, regions such as Egypt held a comparative advantage in the production of cereals[52] and developed (partially by coercion through taxes in kind) into major suppliers of the Roman urban market. Such developments would have reduced (or prevented) stress on Italian rural communities, who were not forced to bear the burden of supplying Italy's sprawling urban population alone. Italian farmers could also capitalize on their comparative advantages. These included, perhaps most distinctively, their proximity to the most important markets in the Empire (which

49 Forbes (1989, 87–97).
50 Forbes (1989, 87–97).
51 States (or landlords) in need of revenue or agricultural produce could also try to claim a greater share of this surplus. Gallant has argued that this is what happened in Hellenistic Greece, with the result that rural populations were far less resilient when faced with shortages, see Gallant (1989, 393–413). The Roman state had a different approach to taxation than its Hellenistic predecessors, extracting less, but more importantly at a fixed ratio. This encouraged productivity enhancing agricultural investments as Monson has argued for Roman Egypt, see Monson (2012). In Italy Roman farmers were even better off: for the peasant the 'spoils of empire' were formed by the abolition of agricultural tax. The ability to pursue risk-avoidance strategies is in this respect a relative luxury, one that could be argued was not open to Egyptian farmers.
52 For a discussion, see Heinrich (in preparation).

assured low transport and transaction costs), not least the behemoth Rome that could consume virtually any marketed surplus, and their exemption from agricultural taxes, (which lowered production costs). These advantages would be most pronounced in goods that were quick to spoil, hard to transport over long distances, and that represented a greater value without requiring prohibitively high investments for smallholders. This means that for smallholders the small-scale production of garden vegetables, fruits for the table and animal products for nearby urban markets could have been more attractive than producing a cereal surplus. In contrast, for large scale producers with sufficient capital, viticulture and oleiculture were likely more profitable avenues to pursue than a primary specialization in cereal cultivation. In this interpretation Italian cereal production would be mainly focused on domestic consumption: to sustain the farmer's household and, with modest surpluses, the population of various rural and other regional urban centres. Meanwhile Rome, and to a lesser degree several other major centres, would have largely been supplied with cereals from outside Italy.

6 Conclusion

In this paper I have attempted to assess how Italian rural communities were affected by Italy becoming the centre of a globalized and growing economy. My focus was on determining which shifts in cereal crop-selection farmers made in order to adapt to the new economic reality. In the literature two main opposing views can be found on this matter. The first is the view that due to economic development the number of cultivated cereals was reduced to the few types that were best suited to a developed market economy. The second view is that though a narrowing down of the crop spectrum should have happened, it did not. The diversity of environmental factors in Italy is usually provided as an explanation in that argument. The archaeobotanical evidence from Italy, at its current state, seems to support the latter view: even if several important biases are taken into consideration, the results still reflect a great diversity in selected cereal crops. A greater focus on archaeobotanical research in the study of Roman rural sites and a wider use of concrete quantification over presence/absence species lists may well enable us to refine the resolution of Italian crop chronologies further in the future, but for now we are faced with a broad spectrum of crops.

How do we explain this diversity? The argument of geographical and climatic diversity in Italy only explains part of the variation. For instance, the suitability for certain conditions may explain the importance of rye in the north

or allow us to model the likely relative importance of bread and hard wheat in the north and south respectively. Differences in functional characteristics between cereals and their potential for different applications or products may offer a partial explanation as well, but raise the question why we do not see such a practical diversity in the Egyptian data. Furthermore, in agreement with Jasny and other theorists, we were able to establish that naked cereals like hard wheat do indeed offer distinct advantages in the context of globalization and economic growth and we were able to quantify these advantages. The choice for such crops is observed elsewhere in the Mediterranean, as the examples of Egypt and Sardinia suggest; so why not in Italy?

Theoretically globalization and growth should favour the specialization in naked cereals like hard wheat, as these are most cost efficiently processed and transported. It could be argued that this is exactly what happened, though not in Italy itself, but in regions with a comparative advantage in the production of cereals such as Egypt. Through this specialization and the resulting greater productivity and output such regions were able to (at least for a time) meet the growing demand by the Empire's increasingly populous urban centres (most notably Rome) without Italian farmers needing to (be forced to) change their cereal production strategies. Perhaps as important as that there were more cereal crops to choose from in Italy than in Egypt (due to its less uniformly restrictive environment) is that choice itself was less restricted. Italy's privileged position removed a key restrictive element from the crop-selection process: agricultural taxation. Agricultural taxes may deliberately or inadvertently affect crop-choice. A farmer may for instance be forced to produce and sell a cash-crop to be able to pay a money tax or focus on the production of a specific tax-in-kind crop convenient to the taxman. More generally, taxes reduce the farmer's profit margin and may force him (in order to avoid losing income) to overexploit his production means or reduce the effort and means devoted to risk-reduction strategies. These causes may lead to suboptimal crop-choices from the farmer's perspective and narrow his options. Italian farmers did not have to deal with these taxes and could therefore more freely choose the crops that fitted their individual situation, or at least did not have to change the crops they were growing already due to tax-pressure. This would have allowed Italian farmers to pursue a combination of strategies. On the one hand, they were able to continue the production of cereals with advantages for subsistence and risk reduction such as emmer wheat, and more generally spread the risk of crop failure over multiple cereals. On the other hand, Italian farmers could devote a larger share of their production capacity to producing marketable surpluses, if only because there was no taxman demanding a share. Part of these surpluses would have consisted out of cereals being deliberately produced for the mar-

ket on larger estates and part out of opportunistically sold 'natural' surpluses from smaller enterprises—though in our primarily urban evidence we cannot separate the two. The comparative advantages of Italian agriculture, such as its close proximity to the most important markets and the absence of taxes, could have made high-value and/or perishable non-cereal products (e.g. wine, vegetables, fruit, meat) more lucrative specialization options than cereals. Such products may have been the primary 'money-makers' for many Italians producers while cereals for many producers remained in the domain of subsistence production, requiring no shift in crop-choice away from previously cultivated cereals.

What is apparent from the current study is that mechanisms such as crop-selection cannot be studied in isolation in a globalized economy and require an interregional or comparative approach. Ironically, in terms of cereal crop-selection, the most profound effect of the globalization of the Roman economy for Italian rural communities was perhaps the absence of the pressure to change. The absence of taxation and the presence of market opportunities broadened options for Italian farmers and provided them with comparative advantages and lucrative opportunities. Though the free monthly allowances of grain and other foodstuffs to the urban population of Rome are much lauded by historians, the 'spoils of Empire' for Italian farmers and landowners were no less impressive.

CHAPTER 7

Peasant Agricultural Strategies in Southern Tuscany: Convertible Agriculture and the Importance of Pasture*

Kim Bowes, Anna Maria Mercuri, Eleonora Rattigheri, Rossella Rinaldi, Antonia Arnoldus-Huyzendveld, Mariaelena Ghisleni, Cam Grey, Michael MacKinnon and Emanuele Vaccaro

1 Introduction

Histories of Roman agriculture and settlement in Italy are often narrated through the opposition of 'intensive' and 'extensive' agriculture. Intensive production is taken to mean a system where by large investments of labor and capital are made relative to land area—typically assumed to be viticulture or grain—with the intent of increasing crop yields. Extensive agriculture is taken to be the opposite—relatively larger land areas receive relatively less investment—typically as pasture—which results in lower yields, but also lower costs. Thus, in the classic narrative, the late Republic sees the rise of massive intensive production, focused particularly on viticulture, which then collapses in the late 1st century AD and is replaced by extensive systems focused on grain and/or pastoralism.[1] The intensive systems are presumed to be motivated variously by rising populations, a widespread availability of cheap, largely slave, labor, and/or the demands produced by a rapidly growing urban market, while extensive systems are motivated by the opposite of these conditions. More broadly, extensive versus intensive systems are often used to argue for vari-

* We should like to thank Dott.ssa Maria Angela Turchetti and Paolo Nannini of the Soprintendenza per i Beni Archeologici della Toscana and Stefano Campana for their kind assistance. This material is based upon work supported by the National Science Foundation under Grant BCS—1063447. Further funding was provided by the University of Pennsylvania Museum of Archaeology and Anthropology, the Loeb Classical Foundation, and the Fondazione Montecucco. Emanuele Vaccaro's contribution was funded by the European Community's Seventh Framework Programme (OFP7/2007–2013) under grant agreement no. 236093, carried out at the McDonald Institute for Archaeological Research (University of Cambridge).

1 Rostovtzeff (1926); Carandini (1985a; 1989b); Vera (1992); Patterson (2006, 66–88).

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ous models of the Roman economy. Particularly, the success and technological advances of intensive systems—irrigation, improved ploughs, increased capacity of draft animals—are used to argue for significant economic growth during the late Republic and early Empire.[2] Extensive systems—particularly a turn to pastoralism—are often associated with the economic decline of the later Empire.

Settlement survey data is often read as a reflection of the degree of intensiveness with which land is cultivated: intensive systems are assumed to produce dense patterns, while a decline in settlement numbers is often interpreted as a shift towards extensive systems.[3] For instance, persistently high settlement numbers in the Roman far *suburbium* attest to the long-term practice of intensive agriculture centered on gardens and small-scale animal husbandry, while declining settlement numbers in the Biferno Valley have been read as evidence of increased emphasis on pastoralism.[4]

The principal alternative to the intensive/extensive binary is the possibility of convertible agriculture. In convertible agriculture, also called ley farming, arable land is alternated not only between nitrogen-weak crops (like cereals) and nitrogen fixing plants (like legumes) but even more importantly, cultivation alternates with extended periods of ley, or pasture. During these periods, pasture is actively, even intensively managed, fodder plants are encouraged, and the land used for grazing. The alternating use of arable and pasture land in multiple year alternations challenges the intensive/extensive binary which tends to read a widespread allocation of land to pasture as 'extensive', presuming less investment and less return per unit area. Geoffrey Kron has argued for the widespread use of ley farming in the Roman period based on an exhaustive examination of the Roman agronomists.[5] However, until now, archaeological evidence has been lacking. Were convertible agriculture in widespread use in Roman Italy, the intensive/extensive binary would be made particularly problematic, both as applied to longue-durée Roman agricultural history, and as will be shown below, to the interpretation of field survey evidence.

This chapter takes up the question of convertible agriculture and the historical utility of the intensive/extensive binary by considering the results from an archaeological project in southern Tuscany. The evidence from that project points to intensive land use and management during the late Republic/early

2 Spurr (1986); Greene (2000); Wilson (2002); Kron (2002; 2012); Hitchner (2009).

3 Alcock (1989); Patterson (2006, 66); De Haas (2012).

4 E.g. Morley (1996, 154–168); Ikeguchi (2006, 20–22); Patterson (2006: 67–68).

5 Kron (2000; 2005; 2012, 159–160).

Empire. At the same time, excavated pollen evidence provides data for an important presence of maintained pasture as well as cereals cultivation, tentatively suggesting the practice of convertible agriculture. Thus, the chapter not only presents some of the first archaeological data for convertible agriculture, but it also challenges the intensive/extensive binary as well as a straightforward reading of agricultural systems from field survey data.

2 The Roman Peasant Project and Peasant Agriculture

The Roman Peasant Project was started in 2009 in the commune of Cinigiano (GR) in southern Tuscany. The aims of the project were to illuminate the lived experience of lower-class rural dwellers by excavating a range of sites identified in field survey, focusing on the 'smaller'/'poorer' end of the surface material spectrum.

Cinigiano lies some 40 km inland from the coast, a long day's walk from the nearest Roman city at Roselle and the Via Aurelia, and a somewhat more challenging journey from the Via Cassia and the Roman towns of the interior. While thus geostrategically somewhat marginal, its position astride the Orcia and Ombrone Rivers and their concomitant adjacent routeways from coast to interior meant that it was hardly isolated from the political and economic impact of either Roman urban development or coastal trade. Indeed, as will be described below, settlement in this region seems to have initiated only after the Roman conquest of Roselle in 294 BC. As Emanuele Vaccaro et al. will describe elsewhere in this volume, this micro-region even boasted its own terra sigillata manufactury, whose products were sold to its denizens, while the other ceramic and numismastic data to hand suggest it was tightly connected to the coastal cities and their economies throughout the Roman period.[6]

The Project uses the results of a 2006–2009 field survey in this area, carried out by one of the directors. This survey applied intensive surface investigations in three major transects, along with aerial photography and selective magnetometry to map settlement patterns in selected zones bounded by the modern *comune* of Cinigiano.[7] The surface survey was carried out with a hand-held GPS that permitted the mapping of scatter morphology and easy re-discovery of these scatters at a later date.

6 See e.g. Ghisleni et al. (2011).
7 Ghisleni (2010).

The survey mapped some 467 topographic units, including sites and off-site scatters, the majority of these of Roman date. Of the datable Roman-period units, some 260, or c. 55%, were of late Republican/early Imperial date—dated by the presence of black gloss and/or Italic sigillata wares (Fig. 7.1). The isolation of two particular, contemporary roof tiles, associated with late Republican and early Imperial ceramics, respectively, aided in the dating of these sites.[8] Of these late Republican/early Imperial units, 54% were sites of under 0.05 ha scatter or off-sites.[9] The one villa in the survey area—Santa Marta—was probably no more than a large farm in this period, while six other 1.5 ha+ sites were identified as 'villages' on the basis of their atomized, dispersed scatter morphologies.

This relatively dense carpet dominated by smaller sites was seemingly a phenomenon of the later 2nd century BC through the first half of the 1st century AD: indeed, the area has no evidence for occupation prior to this period and thus the settlement pattern seems to take off after Roman arrival in the region. After the later 1st century AD the vast majority of these sites—and all of the smallest sites—seem to vanish. The one villa and all of the large villages persist at least through the 2nd century AD, while seven of the larger sites show signs of reoccupation in the later 4th/5th century AD. The overall narrative from the surface survey evidence, therefore, is thus similar to that told for the various river valley surveys (Albegna, Oro, Ombrone, etc.) of southern Tuscany where an increase in sites of all sizes in the 2nd century BC/1st century AD ends at some point near century's end.[10]

The Roman Peasant Project has thus far excavated eight sites and off-site scatters from this survey. As noted above, the purpose of this project was to excavate Roman peasant lives, not test the interpretive paradigms of field survey data and the project's methodologies reflected this fact.[11] Five of these

8 Late Republican tiles had a red fabric with chamotte, while early Imperial tiles had a grey core (Ghisleni 2010).

9 Functional categories used in the field survey and displayed in the maps here included: Village: 1–2 ha, distinct concentrations of ceramic and construction material AND presence of artisanal installations, e.g. kilns; Villa: 1–3 ha, abundant ceramic, presence of luxury architectural remains such as mosaics, columns, etc.; Large Settlement: 1–3 ha, spatial and wealth characteristics unclear; Farm: 0.05–0.15 ha, ceramic and construction materials; presence of storage and/or transport ceramics (amphorae, dolia, etc.); House: 0.01–0.05 ha, characteristics as above, interpreted as single-family house in small cases. Off-sites were defined as scatters measuring a meter or less, or somewhat larger, diffuse scatters producing 1–2 sherds. See Ghisleni (2010).

10 E.g. Attolini et al. (1983); Carandini et al. (2002); Vaccaro (2008).

11 I.e. while sites were subject to total finds collection during the survey, they were not

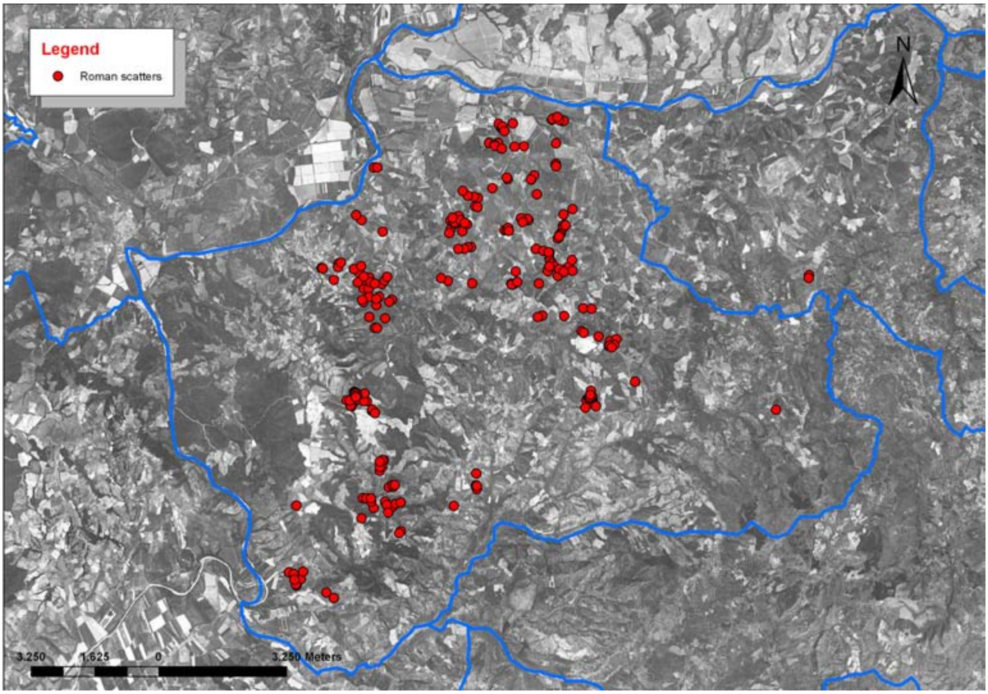

FIGURE 7.1 *Map showing 2nd century BC–1st century AD scatters and off-sites, Cinigiano (GR), Tuscany (M. Ghisleni)*

excavations focused on scatters of 0.25 ha or less, and in one case, on a scatter classified as an off-site: all of these sites date to the late 2nd century BC to early 1st century AD (Fig. 7.2 and Table 7.1). Although this tiny sample size can hardly said to be representative, either of the survey universe or of Roman small sites in general, they do represent an internally coherent group. The following will focus largely on these five sites, with occasional mention made to other sites excavated by the Project.

The discussion will center on two forms of evidence that might be said to characterize intensive/extensive agricultural systems. The first kind of evidence comes from the excavated structures themselves—their morphology and function. The second comes from pollen and archaeozoological data. As will become apparent, the environmental data provides something close to

gridded and re-surveyed prior to excavation. No comparative tests were made of surface, subsurface and stratified artifact assemblages (e.g. Schörner (2012)). Plough-soil was machined and excavation slowed only once stratified contexts were reached.

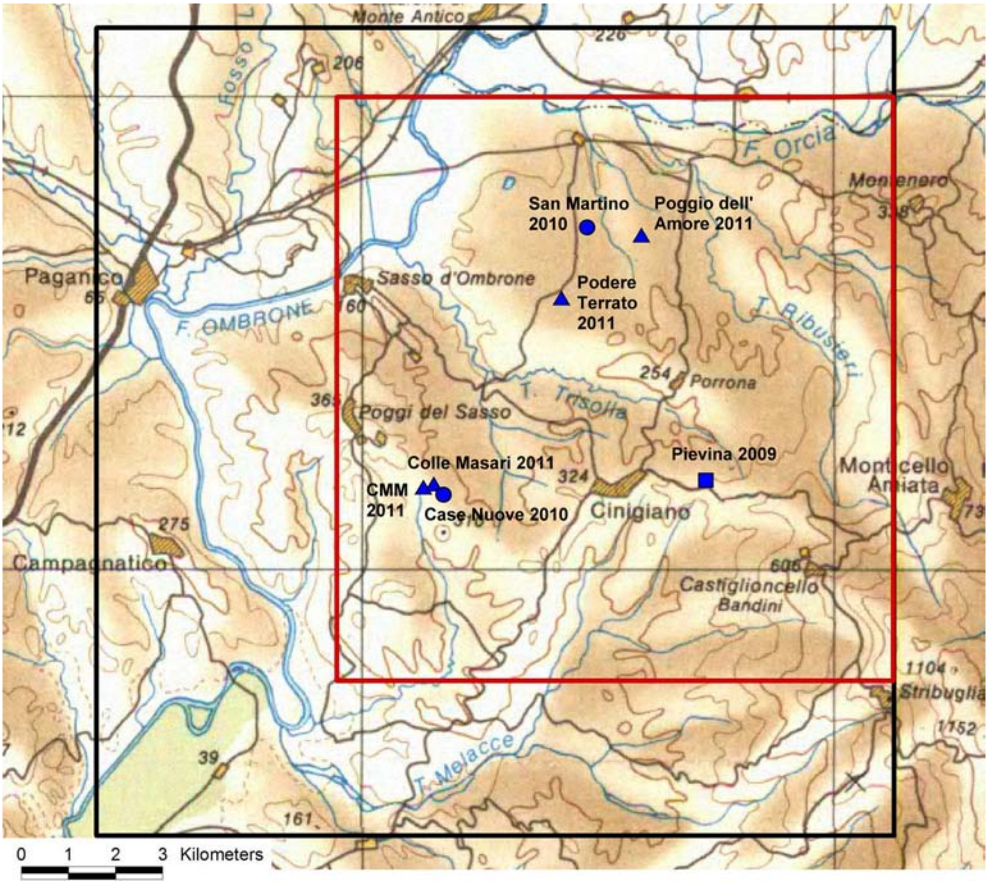

FIGURE 7.2 *Map showing the five excavated sites of 1st century BC–1st century AD date discussed in the text*

primary evidence for agricultural systems—that is, for nearby crops and landscapes, while the data of structures and other finds provide secondary indicators—indications for land use and management which could be in turn related to agricultural systems. This chapter will consider each kind of evidence separately and then in comparison, in order that each evidentiary type—structures and plant/animal remains—can be considered on its own terms as well as in dialogue. As will become apparent, these forms of evidence often fail to tell the same story, and it is only through singular AND discursive readings that their real import becomes apparent. The Project itself has been designed so that all specialists—in geology, botany and faunal materials—contribute to the formulation of the excavation strategy and analyze their material in dialogue with the team as a whole. By doing so, we hope to bring out both the contra-

TABLE 7.1 *The five sites discussed in the text, with a summary of surface survey and excavated data*

Site name	**Scatter morphology**	**Surface scatter(s) area (m)**	**Date: [surface]/excavated**	**Function: [surface]/excavated**	**Ceramics* (sherd count)**	**Faunal * (NISP)**
Case Nuove	3 distinct scatters	(28×13)+ (13×12) (10×10)	[late Republican/early Imperial+ Late Roman]/ late 1st c. BC/early 5th c. AD	[Small house]/ agro-processing point	432	14
San Martino	1 coherent scatter	10×15	[Late Republican]/ late 1st c. BC	[Small house]/ temporary work hut	326	2
Poggio dell'Amore	1 coherent scatter	30×20	[early Imperial]/ early 1st c. AD	[Small house]/ temporary work hut	133	4
Podere Terrato	2 distinct scatters	(50×40) + (5×7)	[Roman]/early Imperial	[House]/house/ temporary work hut and drain	466	3 equid teeth
Colle Massari	1 dispersed scatter	27×17	[Roman]/late Republican/ early Imperial?	[?]/field drain	146	1 sheep/ goat molar

*From stratified contexts of late Republican/early Imperial date only. Ceramics include ALL sherds, diagnostic and non-diagnostic.

dictions and agreements between different datasets—complex relationships which yield a richer agricultural history.

3 The Control of Land: Evidence from Structures and Their Functions

As will be evident from a perusal of Table 7.1, the five sites discussed seemed homogeneous with regards to their small surface scatter size, but were found to be quite distinct upon excavation. While initially interpreted as 'small houses' on the basis of the surface material, all but possibly one were revealed as something quite different. As both our team and Rob Witcher have argued elsewhere, the narrow functional categories often applied to Italian field survey data conceal a huge range of functional diversity.[12] A brief description of each site will illuminate how both the structures and other material remains suggested something other than simple 'houses'.

Four Excavated Case Studies: Case Nuove, San Martino, Poggio dell'Amore and Colle Massari

Case Nuove (2010) was a hill-top site of three distinct scatters.[13] Surface materials included over-fired roof tiles and common wares, plus late Roman cooking pots and color-coated ware, leading to its identification as a small house with possible tile kiln with later Roman occupation. Magnetometry survey indicated four major anomalies, the largest of which was circular and seemed likewise to point to a kiln. The excavation of nearly the whole of the scatter revealed instead a small, open-air agro-processing point, with a surface for foot-treading, a tank with adjacent cuts to support a press, and a deep well (Fig. 7.3). A nearby dump held the remains of dolia and the geological material—fragments of local conglomerate bedrock—excavated to insert and construct the tank. This dump held the only use-phase materials, including a modest (432 ceramic sherds, 14 NISP faunal) quantity of material culture. Residue analysis on the tank tentatively pointed to oil, as did a small quantity of olive stones (endocarps) found in the tank. The tank also held some grape pips (seeds) and a few pedicels, while residue analysis on the dolia yielded signatures for tartaric and other acids associated with wine. The dump materials which dated from the construction and use of the site dated to the mid- through late 1st century BC,

12 Witcher (2006c; 2012); Ghisleni et al. (2011); Vaccaro et al. (2013).

13 The complete site report is published as Vaccaro et al. (2013).

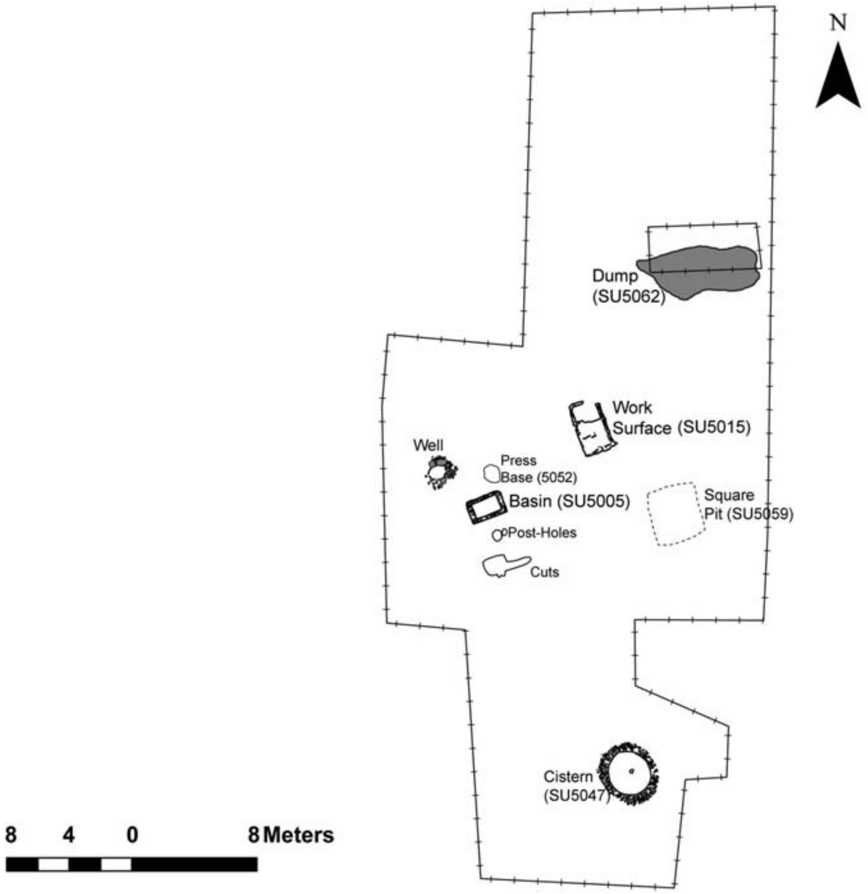

FIGURE 7.3 *Plan of excavated remains, Case Nuove*

while the site was abandoned by the late Augustan/Tiberian period.[14] The site was located some 500 m from the only villa in the region—Santa Marta—which during the late 1st century BC, when this agro-processing point was still in use, was probably still a large farm. Later, possibly contemporary with the abandonment of the pressing installation, the villa expanded to roughly its current size.[15]

Some 300 m to the northwest of Case Nuove lay the highly fragmentary off-site excavated at Colle Massari (2011). Located between the villa of Santa Marta

14 In the early 5th century AD the site was reoccupied, possibly as a winnowing spot for grain. Vaccaro et al. (2013).

15 Ghisleni (2009).

and Case Nuove, the surface material consisted of a 27 m downslope scatter composed of a handful of roof tiles, and a single sherd of Roman common ware. The site was accordingly categorized as an 'off-site' by the field survey, and it was mere curiosity as to the nature of such sporadic surface assemblages that led to its excavation. The results were, to say the least, surprising: rather than any kind of habitation, a 13 m long field drain came to light. The drain was some 0.6 m wide and laid some 0.3 m deep in the ground, then refilled with a loose, permeable mixture of medium-sized (0.10–0.15 m) cobbles (Fig. 7.4). The cobbles were mounded above the ancient ground level, forming a low barrier as well as a drain. Analysis of the area at the top of the drain revealed an ancient ground-water seepage point where water had accumulated. The drain was seemingly constructed to remove this stagnant water and carry it down to a deep natural ravine at the base of the slope. The drain was tentatively dated to the late Republican/early Imperial period by the presence of 1 sherd of Italic sigillata, contemporary cooking pots and highly abraded tiles.

San Martino, excavated in 2010, lay in the rich Pliocene clay area in the northern edge of the survey area. A coherent scatter of 10 × 15 m, it seemed to represent the classic 'small house' of survey categorization. Magnetometry yielded virtually no identifiable anomalies, while excavation revealed a c. 7.2 × 6.5 m structure with a stone socle and pisé walls (Figs. 7.5–7.6). The discovery of a fragmentary gravel gutter on one side suggested a single pitch roof, while the virtual absence of roof tiles led us to reconstruct a straw roof. We now recognize that a tiled roof could have been so completely recycled as to leave no traces and now we are less confident of this reconstruction. In any case, despite reasonable levels of preservation inside the walls, the house seems to have had no hearth, no water storage or indeed any other installations. Ceramic and faunal materials were extremely poor: ceramics yielded only 326 sherds from stratified contexts, while faunal material included only 7 NISP from those same contexts. Among these, however, was a modest quantity (39 sherds) of rather poor quality black gloss dining wares, and among the very sparse faunal remains, the foot bone of a sheep suffering from ostietis or infection. These findings suggested not a permanent 'house', but rather a site in temporary or seasonal use. On the other hand, the theoretical lifetime time of this temporary-use site could have been quite long: black gloss wares and cooking pots dated to the 2nd through later 1st century BC date were found in the floor-make up and fills over the floors, while 1st century BC/AD Italic sigillata and experimental sigillata were found in the interface between the topsoil and collapse, pointing to abandonment in that period.

The virtual absence of macro or pollen remains for collected crops point against crop storage. The only exception was the combined high values of

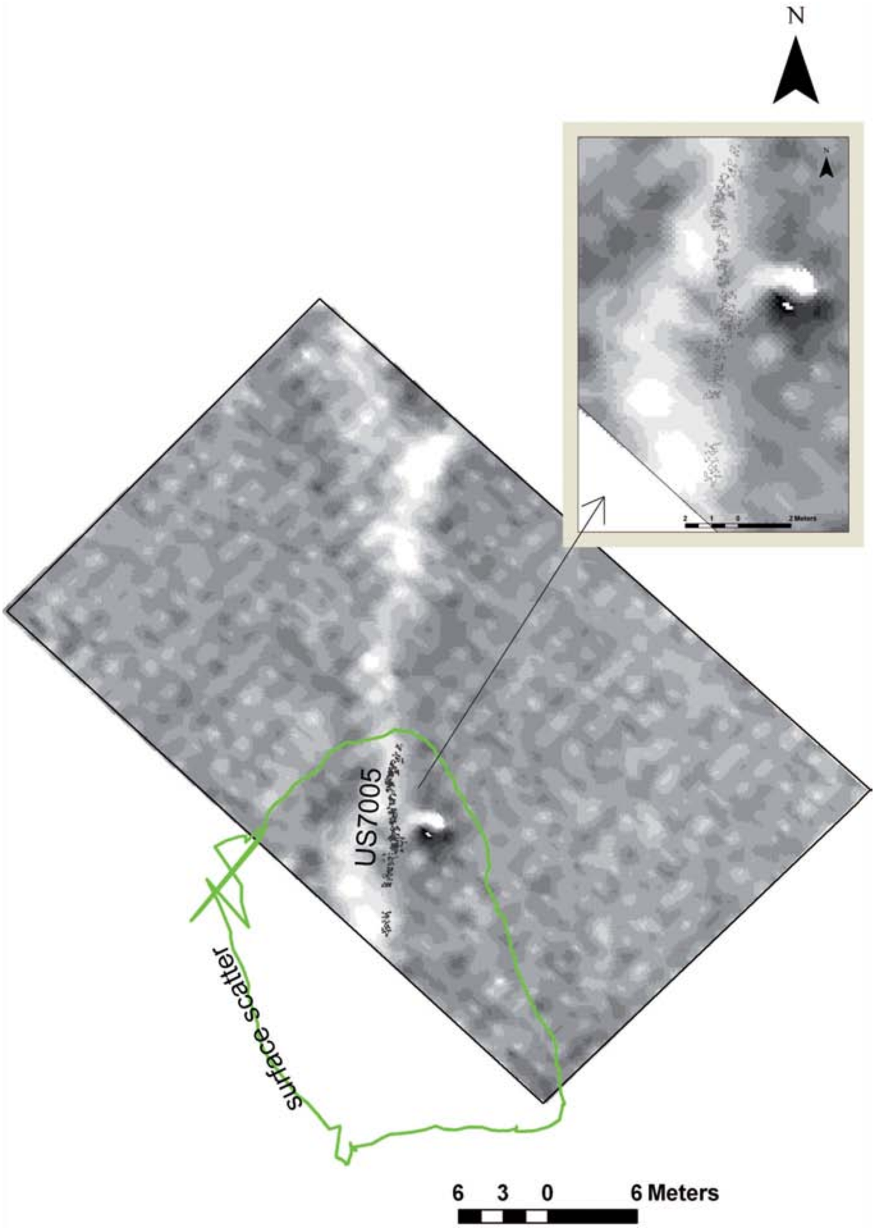

FIGURE 7.4 *Plan of surface and magnetrometry surveys, and excavated remains, Colle Massari*

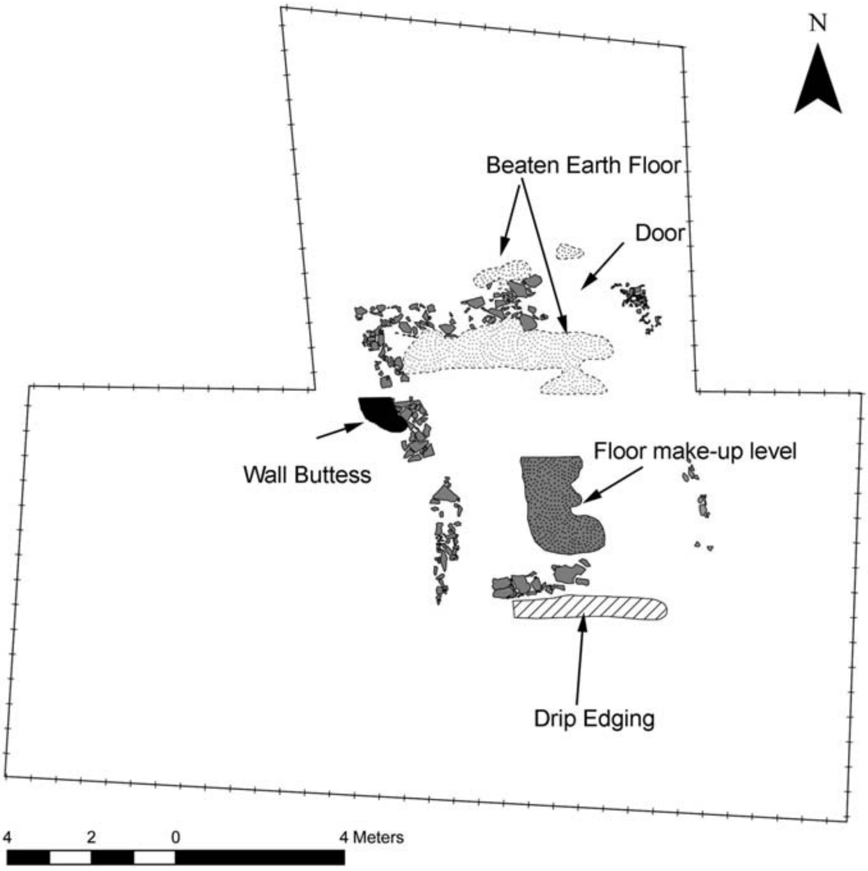

FIGURE 7.5 *Plan of excavated remains, San Martino*

pollen and seeds from legumes (the Fabaceae family)—*Hedysarum*, *Medicago*, *Melilotus* and *Trifolium*—herbaceous plants possibly indicating the occasional presence of fodder. Finds from non-pollen palynomorphs—fungi, parasite eggs and algae—likewise tentatively suggested the structure was occasionally used for animals. Ascospores of coprophilous fungi, mainly *Sordaria* type and *Sporormiella*, are indicative of the presence of faeces. These fungi include species of obligate coprophilous fungi, occurring on dung of both domestic and wild herbivores. The presence of certain parasite eggs (*Dicrocoelium*) is likewise strongly indicative of the presence of ruminant excrement, while other such eggs (*Trichuris*) may derive from domesticates or humans. Finally, the relatively high concentration of algae inside the structure points to water transported to the site—this may be for drinking purposes, but is also often a result of transfer via urine.

FIGURE 7.6 *Reconstruction drawing, San Martino* (*Studio InkLink*)

The amusingly named Poggio dell'Amore, investigated in 2011, is located just across a low valley from San Martino and seemed from the surface material to be in every way its twin. Again marked by a single coherent scatter set mid-slope on a slight incline, the site likewise yielded very little in the way of magnetometric anomalies. Excavation revealed a highly disturbed site, with all but one of its walls and original tile roof robbed during antiquity (Fig. 7.7). The structure was originally c. 4.6 × 2.8 m, again with stone socles supporting pisé walls and here a tile roof. Outside its eastern wall were two negative features, neither of which could be definitively identified, although the northern of these was lined with charred potsherds and might have been a hearth—or a seat for a dolium. A tiny quantity of glass was found on the site, while over half of the small collection of ceramics (133 sherds) was Italic sigillata, much of which may have been produced at the nearby Marzuolo production site.[16] Possible evidence for animal stabling in the form of coprophilous fungi and parasite eggs was present, but in lower concentrations than at San Martino. Like San Martino, the pollen and seeds of herbaceous plants, again pointing to occasional presence of fodder, characterized the botanical record. Poggio dell'Amore likewise seems to have been occupied a relatively short

16 See Vaccaro et al. (this volume).

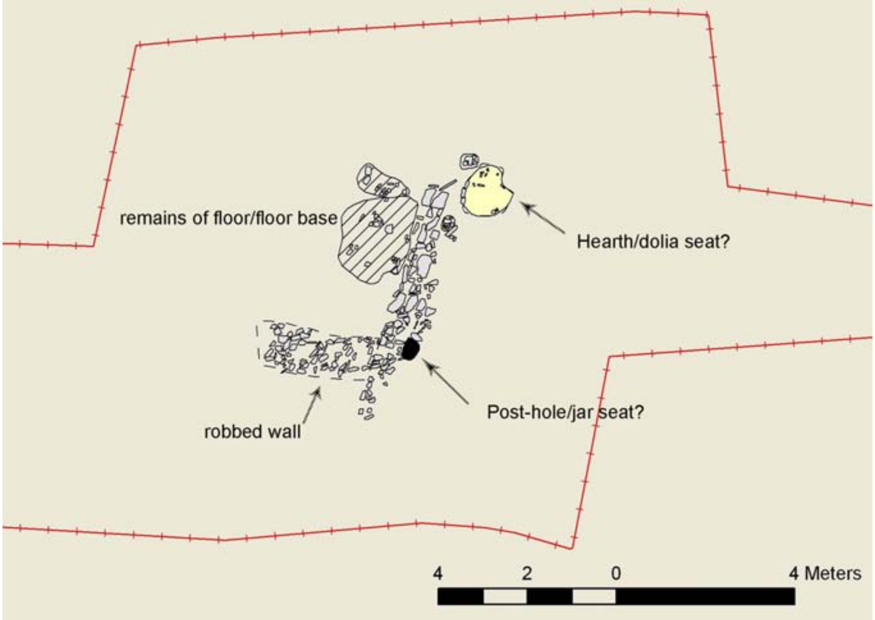

FIGURE 7.7 *Plan of excavated remains, Poggio dell'Amore*

time—seemingly from the Augustan period to c. 70 AD, or possibly only for the later part of that period judging from the preponderance of what may be the last period of Marzuolo-produced Italic sigillata.[17] In brief, then, Poggio dell'Amore was in size, material culture and environmental profile very similar to San Martino, with somewhat more diversified, if less abundant consumer goods.

Podere Terrato was studied in 2011 and seemed to represent a site further along the 'permanent' end of the habitation spectrum. With two scatters, the largest of which measured 50 × 40 m, it was considerably larger than the preceding two examples, and its surface materials included a few fragments of Italic sigillata, coarseware and kitchenware. Magnetometry revealed some walls in alignment, as well as a larger linear anomaly some 20 m away. Excavation revealed a two-roomed structure with L-shaped extensions to the south. One of these rooms had an open northern end supported by a pier—a kind of porch (Fig. 7.8). The site was heavily eroded and only to the south was intact stratigraphy found, seemingly a kind of yard whose irregular natural topography had been filled with packed tiles and other materials, including five coins

17 See Vaccaro et al. (this volume).

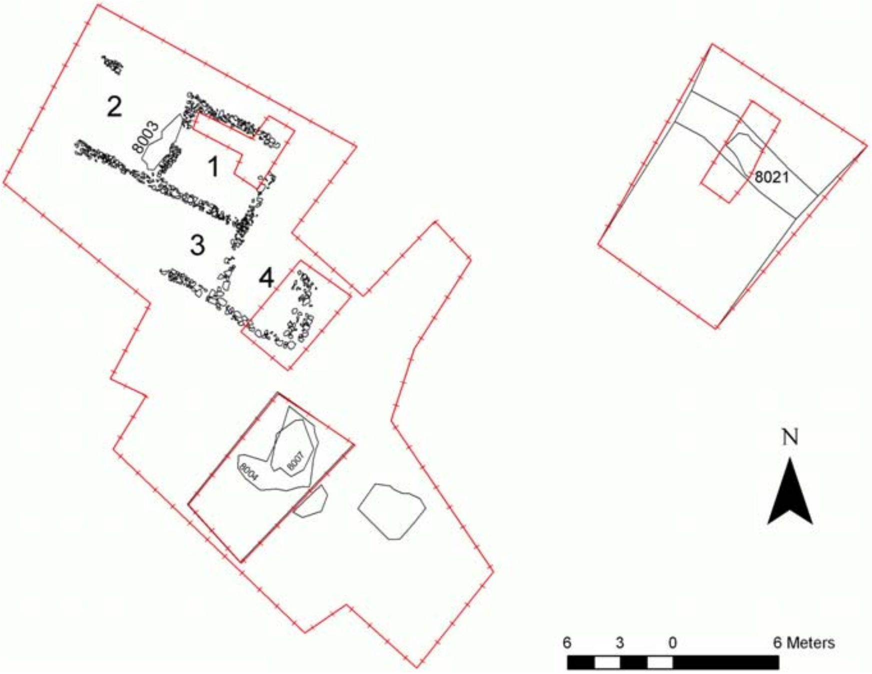

FIGURE 7.8 *Plan of excavated remains, Podere Terrato*

of Augustan through Claudian date. The chronological material indicated that also this site was occupied for a relatively short period from the Augustan period through the first half of the 1st century AD.

Despite this short occupation, the more complex nature of the structure, the somewhat richer material culture, which included 466 sherds of ceramics (comprising a wide range of dining and cooking wares, some transport amphorae), 5 coins, and above all rich botanical evidence, all pointed towards more stable human habitation than the others considered here. The pollen and macro-remains evidence, discussed further below, included a series of species that, if cultivated and not wild, could indicate a garden: there were flowers including roses, lilac and bell-flower; herbs such as milk parsley, carrot/dill, sage and mint; and among the marcoremains, species like cerley and garden orache that could be cultivated as both vegetables and herbs. Faunal data from the site were minimal and devoid of materials linked to typical food waste, suggesting perhaps a separate location for such consumption rubbish. Curiously, however, a few scattered equid tooth fragments were recovered from the site (one of the greatest concentrations of equid remains from any of the sites excavated in our campaigns) perhaps themselves indicative of some presence of pack animals at Podere Terrato.

To the northeast, a second strong anomaly was found to represent a field drain, excavated to a depth of 0.5 m and its bottom filled with small cobbles and broken tiles, 0.01 m in diameter. This drain follows the natural slope of the land, NW-SE. The Pliocene clay soils here exhibit significant undulating topography, signs of natural water erosion and of local long-term points of ground-water seepage. Thus, it seems likely that the field drain, like that at Colle Massari, was constructed to carry ground water seepage away from agricultural/pastoral land.

A Spectrum of 'Habitation' and Intensive Land Use

The above-described five structures were nearly all initially identified as 'houses'. None, however, was found to correspond exactly to a permanent habitation, but rather represented a whole range of other functions—temporary work/stabling point, drain, agro-processing, etc. As we have discussed elsewhere, these findings have significant implications for our understanding of the demography and economy of the region. The explosion of sites of all sizes in the 2nd century BC in our region and elsewhere in central Italy would appear to signify a significant demographic expansion. The majority of such sites in our survey are comprized of the smallest scatter categories, categories we suggest may represent not permanent but temporary spaces used by the same people represented by the larger sites. Thus, while the number of occupied sites increases overall in this period, the demographic expansion is represented by only a portion of these sites and thus the overall population increase, if there were one, was almost certainly less pronounced than it would appear from the survey data.

Rather than representing people in a demographic count, the five sites discussed here can be better interpreted as signals of greater human control over productive landscapes during a very specific chronological period. The field drains at both Colle Massari and Podere Terrato point to the careful drainage of even minor ground water seepage points and a concern to prevent field flooding and stagnant groundwater accumulation. In both cases the drains represent significant investment, excavated up to 0.5 m into the ground and filled with a regularly-sized assemblage of cobbles and/or tiles, designed, much as modern Tuscan *dreni* do today, to filter and funnel run-off. As will be discussed below, it is possible that the drains at both Colle Massari and Podere Terrato may have been used to drain fields with either cereal crops, pasture or crops and pasture in rotation.

The small structures at Poggio dell'Amore and San Martino are more complex, but likewise do not seem to represent traditionally defined permanent habitations. Their tiny collections of material culture, and especially lack of

clear cooking and storage installations and near total absence of faunal material point to spaces used on a less permanent basis. As a comparison, the site of Pievina excavated in 2009 had a 5th century structure, which, at 9.8 × 4.5 m, was even smaller than San Martino. Its material culture, however, was far richer, with 1324 sherds of ceramics and some 292 NISP of faunal material (vs. 326/7 respectively, at San Martino). These numbers only represented the excavated portion of these phases; much of the site remained unexcavated and thus the overall site tally would be much higher. These factors, together with a possible exterior hearth, as well as a drain that carried water around the structure protecting it from inundation and a beaten earth yard, suggested cooking dining, sleeping and the other activities indicative of more durable settlement. San Martino and Poggio dell'Amore, on the other hand, had none of these characteristics and thus seem to reside towards the 'transient' end of the habitation spectrum. Their most likely function was as temporary animal shelters and general work huts.

Like the field drains, the construction of such temporary use structures points to an investment of labor and materials, particularly if these structures were used only sporadically and lasted only a generation or two. The use of a wide variety of building stones—culled from various places and/or recycled from a variety of earlier buildings—describes a deliberateness of action and long-term planning which is likewise surprising and revealing.[18] Again, this investment seems motivated by a desire for more efficient control of land and its resources: these huts seem to have held small quantities of fodder, nursed sick animals, and from small remains of dining and cooking, served as occasional rest/eating places. They thus would have permitted their users to operate longer and at greater distance from a more permanent base, increasing mobility and maximizing the use of more distant properties. A site like Podere Terrato, with more complex architecture and material culture (yet still very thin by comparison with a site like Pievina), reveals the spectrum of 'permanence' of such points, from overnight stopping point to a larger structure, adjacent to the fields, complete with herb garden.

Finally, the agro-processing point at Case Nuove points to yet another type of specialized site—the stand-alone pressing point not situated inside a farm or villa. The absence of any roofed structures and the distance from habitations, plus the small scale of the apparatus, lead us to interpret this site as a collective endeavor, used by a variety of nearby farmers during the fall harvest

18 See the data published in Ghisleni et al. (2011). Similarly diverse geological origins have been noted for building stones from San Martino, Poggio dell'Amore and Podere Terrato.

months.[19] The two presses, built here in *opus signinum*, thus would represent a shared investment in more 'advanced' durable technology over simpler wooden troughs and hand presses. Such shared, specialized processing points are still found in central Italy where farmers still take their olives to a local *frantoio* rather than investing in costly presses themselves. Given the proximity to the only site in the region that would develop into a villa, we have also suggested this site may have been provided by the owners of that site as a means of expanding their influence towards a cluster of sites to the south.

On the whole then, the data from these five sites find the farmers in this region taking consistent, if diverse steps to more effectively control and manage their land, investing considerable resources to this effect. Thus far, this investment appears to be a concentrated, short-lived moment, lasting from the end of the 2nd century BC and ending by the mid-1st century AD. This evidence alone would point to a classic moment of intensive agricultural practice in this region.

4 The Land and Its Products

Just as pollen data provides rich new data on site function, so, too, it provides a richer, and more complex picture of the agricultural regimes in each site's micro-region. In short, pollen can help uncover the crops and other characteristics of what we will call here the site locale—the 1–2 km area in which site occupants, plants and landscape interacted.[20]

Pollen data is not without its problems and challenges, however. Similar percentage values of pollen of different taxa may mean different things, not least because some species are in general under-represented (e.g. cereals or pulses, and *Tilia* among trees), and others may be over-represented (e.g. Cichoriae, and *Pinus* among trees). Therefore, no linear correspondence exists between the amount of one type of pollen in a spectrum and its significance. Interpretation of pollen data must also consider the biological features, especially physiology and phenology, of the mother species. This helps determine how the pollen is transported to the site, through wind or water (natural transport) or animals/man (direct or indirect anthropogenic transport).[21] Furthermore, even excavated pollen is the result of the many years of accumulation: the

19 Argued in Vaccaro et al. (2013).
20 We are using a modified version of the concept of locale as defined in Agnew (1987) and applied by Blake (2001).
21 Faegri et al. (1989); Pearsall (2000); Mercuri (2008).

pollen spectrum for a particular archaeological context thus may represent the accumulated residues of different crops grown in different years. As we shall see below, teasing out information concerning rotation and other forms of convertible systems from pollen data is therefore challenging. Thus, rather than a definitive map, the pollen data provides a set of hypotheses that can be laid against other data—structures, faunal data and Land Units analysis (see below)—the result of which forms kind of 'thick description' of human/land interactions in the locale.

A note on the collection of biological and geological data should be made before continuing. Plant data included both macroremains and pollen. All stratigraphically significant contexts were wet-sieved for macroremains with sieves of 10, 0.5 and 0.2 mm. Pollen was collected through syringe extraction from newly cleaned sections, as well from one or two non-archaeological contexts in the vicinity of the site to obtain near-site background levels. Pollen was treated in the laboratory according to the routine method for pollen analyses of the laboratory of Modena.[22] Counts were performed on permanent slides now collected in the Reference Pollen Collection of Modena. Identifications were made at 1000× magnification. In addition to pollen, studies of Non-Pollen Palynomorphs (NPP's), and microcharcoals were also carried out on these samples. The charcoal data is undergoing review and is thus not presented here. Faunal material was collected from all contexts, and via wet-sieving. All identifiable pieces that could be recorded to element and species/taxonomic level were catalogued. Ribs, vertebrae, and miscellaneous long bone and cranial fragments that could not be identified securely to species were grouped according to size categories (e.g. large = cattle-sized; medium = ovicaprid- and pig-sized) and counted as the 'UNID' portion of the faunal sample. NISP (= Number of Identified Specimens) tallies included individual teeth within mandibles and maxillae.[23] Finally, Land Units are defined as portions of the territory with homogeneous characteristics of soil, substrate, geomorphology and hydrology.[24] The Land Units map offers a useful way to read, communicate and interpret the physical landscape. Moreover, it allows the application of land evaluation, particularly hypotheses about agricultural production potential (Fig. 7.9).

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22 See Florenzano et al. (2012).

23 The term "ovicaprid" encompasses both sheep and goats, and is here used interchangeably with "sheep/goat". The two taxa are often grouped together in zooarchaeological analyses because of their similar osteology. The criteria outlined by Halstead et al. (2002), Zeder and Lapham (2010) and Zeder and Pilaar (2010) aided in separating sheep and goat elements. Measurements follow the guidelines of Von den Driesch (1976).

24 Sombroek and Sims (1995).

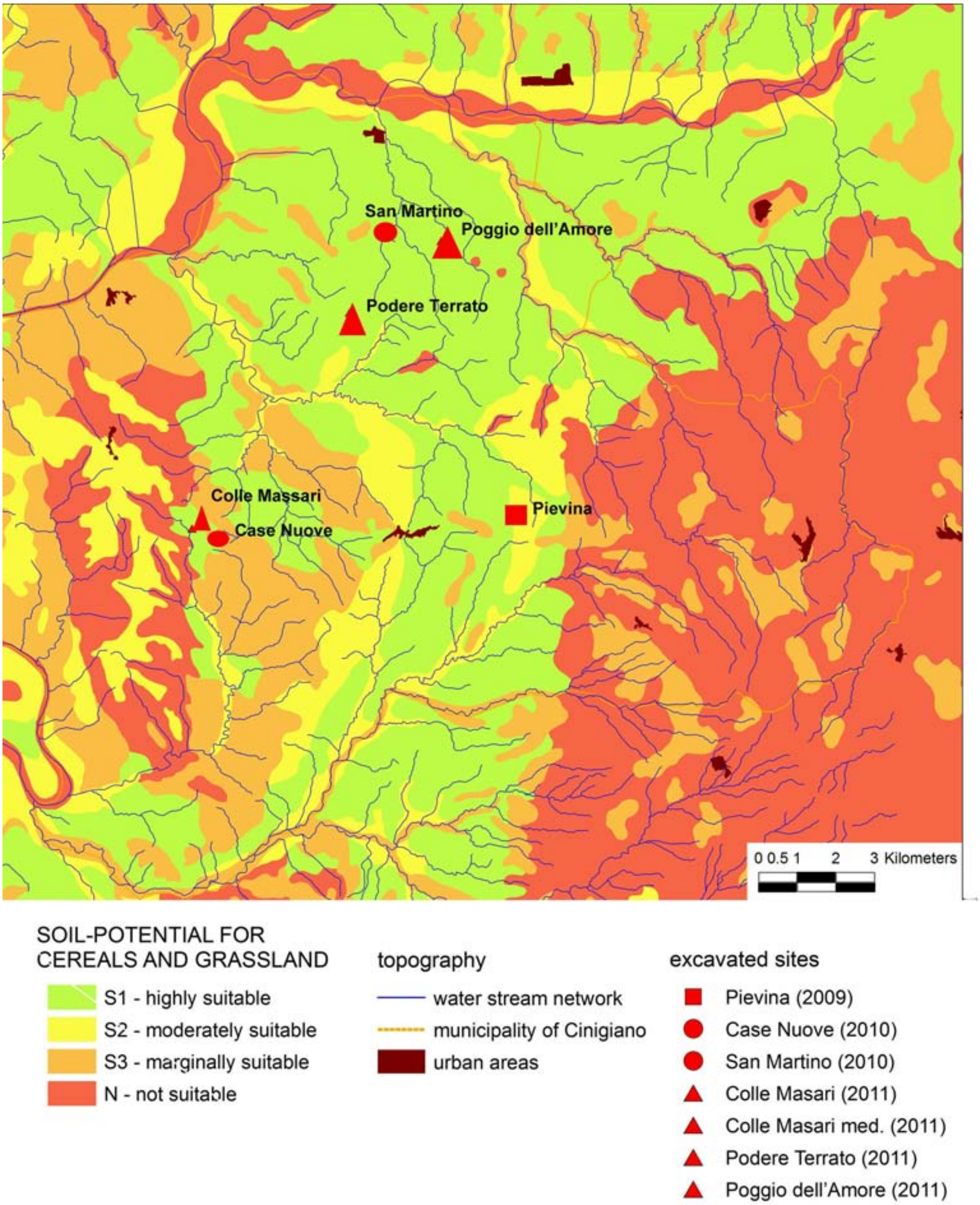

FIGURE 7.9 *Soil suitability map of the study area, showing location of excavated sites (A. Arnoldus-Huyzendveld)*

The map was created by combining data from stereoscopic aerial photographs with the available geological maps, thus representing presumable zones of soil qualities, underlying geologies and hydrological resources. The contents and outlines of the map units were then field checked and tested.[25] The Land Suitability for crops and tree crops were then established for each Land Unit. For low-technology agriculture, we considered clayey soils more suitable than fine sandy soils, since they have a higher natural fertility and water availability, although they are harder to plough.

Environmental Data from the Five Case-Study Sites

The environmental data from late Republican Case Nuove was challenged by the fact that no pollen could be collected from the use-phase strata due to root penetration into these strata. Thus, the pollen information comes from the site's later, 5th century AD phases, while the macroremains and faunal collections come from both the late 1st century BC and late antique phases (see caption for Table 7.2). As mentioned above, the presence of endocarps of olives and grape pips in small numbers in the press basin indicates that crops were carried to the site. The low percentages of Olea pollen (0.1%), on the other hand—again, taken from later contexts—indicate that there were no olive trees within 1–2 km from the site in the Late Antique period. The very low (0.03%) quantities of *Vitis* pollen, on the other hand, do not necessarily indicate the absence of grapes: the absence or low amount of this pollen in archaeological sites is common, possibly a by-product of low-pollen production.[26] Were this situation also reflective of late Republican realities—a big 'if'—it would thus seem that olive, if not grape, were transported from some distance for processing here.

Significant in the pollen record at Case Nuove, and, as we shall see, at every site for which we have data, are pastures. The Arboreal/Non Arboreal pollen ratio (AP/NAP) was 13/87, suggesting that herbs were dominant in the landscape while trees and shrubs were sparse. Local Pastoral Pollen Indicators (LPPI), a subset of the Non-Arboreal pollen, are a group of species strictly correlated to local pastoral activities.[27] LPPI were abundant here, composing some 41% of the pollen spectrum. Further secondary evidence for fodder pasture

25 Arnoldus-Huyzendveld and Pozzuto (2009).

26 Turner and Brown (2004); Mercuri et al. (2010).

27 The Local Pastoral Pollen Indicators (LPPI) was calculated by including some Asteraceae-Asteroideae (i.e. *Aster* type, *Centaurea nigra* type, *Carduus, Cirsium* type, *Matricaria* type) and Cichorieae (*Hieracium* type, < 18 µm), and other Cichorieae (Florenzano et al. (2012)), *Galium* type, *Heracleum* cf., *Potentilla* type, *Ranunculus* type and Ranunculaceae indiff.

TABLE 7.2 *Selected sums and taxa from archaeobotanical data (pollen percentages; non pollen palynomorphs and microscopical charcoal particles concentrations; number of seeds and fruits found in the examined litres of sediments)*

Archaeo-botanical record		Sites				
		Case Nuove	Colle Massari	San Martino	Poggio Dell'Amore	Podere Terrato
Pollen	*No. of palynological samples*	*15*	*7*	*8*	*5*	*11*
	Trees %	**8.6**	**18.3**	**13.4**	**11.6**	**14.8**
	Shrubs %	**4.4**	**1.2**	**2.1**	**1.2**	**1.4**
	Poaceae (excl. cereals) %	**16.8**	**4.8**	**14.7**	**10.4**	**10.4**
	Asteraceae %	**39.9**	**46.9**	**49.2**	**42.7**	**43.0**
	other Herbs %	**30.3**	**28.8**	**20.6**	**34.1**	**30.4**
	Pinus %	1.5	5.8	5.6	5.6	6.0
	deciduous *Quercus* %	4.5	9.1	3.8	4.4	4.8
	Corylus%	0.4	0.2	1.0	0.4	0.2
	Rosaceae fruit trees (*Prunus-Rubus-Sorbus*) %	0.2	0.2	0.1	0.1	< 0.1
	Juglans %	–	< 0.1	–	–	–
	Olea %	0.1	0.1	< 0.1	0.1	< 0.1
	Vitis %	< 0.1	–	–	–	0.1
	Avena/Triticum + *Hordeum* groups %	2.1	2.2	0.9	0.9	1.5
	Other cereals (*Secale*, Cerealia indiff.) %	2.4	1.6	0.5	2.1	1.7
	Cereals total %	**4.5**	**3.8**	**1.4**	**3.0**	**3.2**
	LPPI sum %	**41.1**	**47.8**	**43.3**	**46.8**	**44.6**
	Fabaceae (Legumes) %	4.5	1.3	5.5	3.0	2.7
	Other Anthropogenic pollen (*Urtica* + *Plantago*) %	1.8	0.9	2.1	2.4	2.0
	Hygrophilous trees (*Alnus-Populus-Salix*) %	1.7	0.9	2.4	0.6	2.2
	Hygrophylous herbs (Cyperaceae, *Phragmites*, *Typha*) %	2.9	3.9	1.5	2.5	1.9
	Aquatics %	0.8	0.3	0.3	1.5	1.3
	Wet environment sum %	**5.4**	**5.1**	**4.2**	**4.7**	**5.3**
NPPS—Microch	*Arnium* type conc.	–	4	–	9	3
	Chaetomium conc.	–	2	181	110	95
	Delitschia type conc.	3	–	17	–	–

TABLE 7.2 *Selected sums and taxa from archaeobotanical data* (cont.)

Archaeo-botanical record		**Sites**				
		Case Nuove	**Colle Massari**	**San Martino**	**Poggio Dell'Amore**	**Podere Terrato**
	Podospora type conc.	–	–	68	10	–
	Sordaria type conc.	1016	6	171	–	–
	Sporormiella type conc.	4	1	83	212	69
	Coprophilous fungi conc.	**1023**	**13**	**520**	**342**	**166**
	Other fungi conc.	1038	351	4640	1565	2515
	Parasite (*Capillaria*, *Dicrocoelium*, *Trichuris*) conc.	12	–	93	7	7
	Algae conc.	283	134	2249	599	750
	Charcoal particles conc.	780	164	562	443	289
Seeds/ fruits	*No. of samples for macroremains*	*3*	*3*	*2*	*5*	*6*
	No. of litres studied for macroremains	*204*	*60*	*11*	*85*	*145*
	Juglans regia—endocarps	–/10	–	–	–	–
	Olea—endocarps	9/27	–	–	–	–
	Rubus fruticosus—endocarps	–		–	–	1
	Vitis—seeds + pedicels	12/274	–	–	3	3
	Ficus carica—achene	–	–	7	–	–
	Cereals (*Triticum* sspl., *Hordeum vulgare*)—caryopsis	3/95	–	–	–	–
	Other cereals (indet.)—caryopsis	1/39	–	–	–	–
	Fabaceae—seeds and legumes	5/17	–	–	–	–
	Herbs for fodder—seeds and legumes	3/20	–	10	14	24

Notes: LPPI sum %: *Aster* type, *Centaurea nigra* type, *Carduus*, *Cirsium* type, *Matricaria* type, Cichorieae (all types), *Galium* type, *Heracleum* cf., *Lotus*, *Potentilla* type, *Ranunculus* type and Ranunculaceae indiff.

Cereals—*Triticum* sspl: *Triticum aestivum/turgidum, T.dicoccum, T.monococcum, T.sp.*

Legumes (seeds): *Lens culinaris*, cf. *Pisum arvensis*, *Vicia sativa* (cf ssp *segatalis*), Fabaceae indet.

Herbs for fodder (seeds): Legumes: *Hedysarum coronarium*, *Lotus corniculatus*, *Medicago arabica*, *lupulina*, *minima*, sp., *Melilotus* cf. *alba*, *officinalis* type, sp., *Trifolium arvense*, *T.campestre*, *T.dubium/campestre*, *T.hybridum*, *T. micranthum*, *T.pratense*, *T.repens*, *T.*cf. *striatum*, *T.*cf. *subterraneum*, sp.; and *Geranium* cf. *columbinum*, *G.dissectum*, sp.

Macroremains for Case Nuove = late Republican/late antique contexts

comes from coprophilous fungi and parasite eggs, associated with browsing ruminants. In late antiquity, cereals were also a significant part of the locale (4.5% on average)—a number rendered even more significant by the fact that these grains are known to be underrepresented in pollen rain and diminish rapidly from point of origin.[28] The species distinguished in macroremains include a mixture of wheats and other cereals: *Avena/Triticum* group (*Triticum aestivum/turgidum*, *T. dicoccum*), *Hordeum* group (*T. monococcum*, cultivated barley, and some wild species) and *Secale* (rye).

Moving over the hill to the field drain at Colle Massari, a similar picture of that micro-environment emerges. While very little chronological information emerged from this drain, the evidence points to a single-phase construction during the late Republic/early Empire, and thus possibly overlapping with the use of Case Nuove. How long the drain continued in use is not known and thus to what extent the data can be compared with the late antique data from Case Nuove is unclear. In any event, a somewhat more wooded environment is suggested with AP/NAP at 19/81 with a heavier dominance of oak. Again, however, it is pasture that dominates with an LPPI of 47.8%. Cereals are likewise significant here—some 3.8% of the pollen spectrum—again indicating proximate cereal crops.

At San Martino, a single-phase site, the environmental picture for the late 1st century BC is somewhat clearer. The AP/NAP ratio (15/85) was almost identical to Case Nuove, again pointing to few woods and a predominance of herbaceous plants. The most prominent trees were *Pinus* (pine) (5.6 on average%), deciduous *Quercus* (oak) (3.8%), and *Alnus* (alder) (2.1%), while *Olea*, the only tree with crop value, was <0.1%. Interestingly, the off-site samples showed much the same ratio (20/80) indicating that the advent of the site had only a minor practical impact on the forestation of the immediate area. Cereals were low in quantities (1.4%), but given the sparse dispersal of cereal pollen, this may indicate the presence of cereals fields at some distance from the site. Again, the same mixture of different kinds of wheat, barley and rye appear.

It is overwhelmingly pasture species that dominate the pollen spectrum at San Martino. LPPI pollen are 43%, and include Asteroideae (including *Aster* type, *Centaurea nigra* type (knapweed) and above all Cichorieae), Ranunculaceae, and *Galium* type. It is Cichorieae, however, which are most abundant (35%). Cichorieae (the chicory/dandelion family) are plants NOT browsed by ruminants and thus they mirror grazed lands.[29] They therefore tend to be over-

28 Hall (1989); Dreßler et al. (2006).

29 Behre (1986); Hjelle (1999); Mercuri et al. (2010).

represented, and may be better preserved than other pollen grains in poor sediments because they have a very resistant exine that is easily identified and counted. However, the spectra from San Martino—and from the other sites in the surroundings—are so coherent that an environmental, rather than a taphonomical, significance should be attributed to Cichorieae. Legumes such as *Dorycnium, Lotus*, *Trifolium* and Fabaceae indiff., together with part of the Poaceae-wild group pollen all include species that may be cultivated for fodder. Other herbs are common in pastures or in abandoned fields that can be browsed (Brassicaceae, Caryophyllaceae, etc.) and represent lands that may have been used as grazing areas.

Thus, the landscape around San Martino was open, practically without trees, with pastures near the site. Cereal fields were located further away. Probably, shrubs and some fruit trees (of the Rosaceae family) marked boundaries among fields, while the woods, mainly oaks, were distributed far from the site. The diversity of pasture-grazing plant species, the presence of coprophilous fungi, parasite eggs, and the high values of Cichorieae pollen suggest that pastures covered an important part of the lands all around and in the vicinity of the site.

At Poggio dell'Amore, only 1 km east of San Martino, the situation is similar, but there are important differences. Again the AP/NAP ratio is approximately the same, 13/87, and again, *Pinus* (5.6%) and deciduous *Quercus* (4.4%) predominate among trees while *Olea* (0.1%) is similarly present only at a distance from the site. Unlike San Martino, however, there is somewhat more evidence for cereals: *Hordeum* group, and fewer amounts of *Avena/Triticum* group total some 3%, twice the percentages as at San Martino, and this, along with the presence of *Tilletia*, which is a fungus pathogen of plants (including *T. tritici* and *T. secalis*), and particularly a parasite of cereals, suggest some cereals were grown near the site.

Again, however, it is pasture that predominates. LPPI here is 47% on average, with Cichorieae at 34%—almost identical numbers to San Martino. Many of the same herbaceous species also appear, although there are differences: *Artemisia* (wormwood/sagebrush), *Carduus* (thistle), and *Centaurea nigra* type, are more common than the Asteroideae, and *Potentilla* type of the Rosaceae.

The final site with analyzed pollen data is Podere Terrato, the site with the more elaborate architecture and a nearby field drain. The AP/NAP was approximately the same as the aforementioned sites at 16/84, with *Pinus* (6.0%) and *Quercus* (4.8%) again predominating. Unlike the other sites, however, the area around Podere Terrato had a somewhat more significant presence of woody crops, particularly *Corylus* (hazelnut, at 0.2%), Rosaceae fruit trees, and *Vitis* 0.1% on average. Fragments of *Vitis* seeds were likewise found in the building—both suggesting a greater proximity/density of vines than at other

sites. As mentioned above, even tiny percentages of *Vitis* pollen may indicate nearby vineyards. Cereals (3%, again *Hordeum* group, *Avena-Triticum* group and here *Secale*) were also probably to be found nearby.

Again, however, pasture predominates with LPPI of 44.6%. Cichorieae are around 32%, while other pasture species are very similar to those found at Poggio dell'Amore. Podere Terrato, thus, while largely dominated by pasture had grain, vineyards and possibly hazelnut trees nearby, while adjacent, perhaps in these L-shaped enclosures near the structure, herbs/vegetables may have been grown.

Agricultural Strategies and Land Use

The data drawn from the pollen evidence tell a somewhat different story than that from the structures, macroremains and other indicators for site function. While the expansion of small sites, the micro-management of the land and the significant investment in structures bespeaks intensive agricultural systems, the pollen evidence points overwhelmingly towards a major part of land being allocated to grazed pasture. The significant presence of browsing indicators, like the Cichorieae, indicates specifically pastures whose plant composition has been impacted by animal browsing. The significant quantities of fodder plants—particularly legumes—at San Martino and to a lesser extent at Poggio dell'Amore and Poggio Terrato—suggest both deliberate cultivation of fodder plants, and the occasional collection of fodder in these structures, presumably, judging from the NPP data, for the likewise occasional stabling/shelter of animals. The structures in question are too small to have acted as shelter for large herds; rather, we should imagine them as serving as multi-purpose shelters/work huts in a pastoral landscape.

The construction of field drains to drain seemingly even insignificant outwellings of groundwater may be part of this carefully curated pastoral landscape. Roman agronomists included lengthy expositions on the need for careful drainage, including for pastures where stagnant standing water would collect parasites that might adversely affect animal populations.[30] While elaborate field drainage systems have come to light recently in France, the archaeological data for the Italian landscapes described by the agronomists have been, until now, lacking.[31] The high LPPI quantities suggest that pasture or cereals alternating with pasture seem to have grown proximate to the drains at both Colle Massari and Podere Terrato.

30 See discussions in White (1970, 146–150); Spurr (1986, 20 and 57–58); Kron (2012).

31 Berger (2008).

Near Podere Terrato, Poggio del'Amore, Colle Massari and possibly near Case Nuove in its Republican phase, we find these significant areas of pasture alternating—either spatially or in temporal rotation—with cereal fields and legumes. As described above, the small percentages of cereal in the pollen spectrum (3.0–4.5%) probably underrepresent what was a significant presence of cereals in these landscapes. The cereals found are always a mix of varieties—wheat, barley, and rye—and where we have macroremains, such as at Case Nuove, we find even a range of wheat varieties—*Triticum aestivum/turgidum, T. monococcum, T. dicoccum*. Again, the pollen data may be describing yearly alternation of species, or it may point to multiple cereal varieties being cultivated together in a single year. Near Podere Terrato, small vineyards were also added to the mix, while olive groves seem to have been small and few throughout our landscape.

An examination of the surrounding geological and hydrological conditions, by means of a Land Units Map, further suggests that this mixed regime with important presence of pasture was not dictated by environmental conditions, but by choice. An examination of the Land Units around each of the five sites in question, and comparison with the pollen data from each site, allows us to compare land potential with possible land use. The land around San Martino, Podere Terrato and Poggio del'Amore is dominated by Pliocene clays in a gently rolling landscape, rich with springs and *torrente*—seasonal streams. The locale is dominated by Class S1 Land Units, the most suitable for cereal agriculture, defined as "having no significant limitations to sustained application of low technology cereal cultivation, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level." Thus, although the adjacent land was highly suitable for cereal and other kinds of agriculture, the land was instead developed as pasture with interspersed fields of cereals and occasional vineyards near Podere Terrato. Conversely, the land units around Case Nuove and Colle Massari were far less adapted to widespread cerealiculture, with S1 land units interspersed with land less adapted (S2 and 3) for such cultivation. Nonetheless, during both the late Republican/early empire and in late antiquity the area immediately around the Case Nuove and Colle Massari was probably surrounded by cereal fields, as well as by some possible vineyards.

The comparison of Land Units and pollen data thus suggests that choice, rather than solely land suitability, played a major role in the articulation of agricultural land. Even confronted with very similar environmental conditions—as existed between San Martino and Podere Terrato, for instance—landowners/workers might make very different choices as to how to cultivate and manage a particular piece of land: in the case of San Martino the land was heavily

invested in pasture while at Podere Terrato, a more mixed regime, including a possible herb garden, was elected.

Taken as a whole, it is also possible that the data describes various versions of convertible agriculture. As described above, convertible agriculture sees the same land ploughed during several years for arable crops, including cereals and legumes, followed by extended periods of pasture. The pasture replaced fertility more effectively than legume rotation not least by providing manure from pasture animals that graze upon it. It should be emphasized that pasture rotation typically lasts for some years, as time is required to produce a firm sod bed that will support intensive grazing. As Kron has argued, the Roman agronomists describe a rigorous regime of pasture maintenance with planted fodder crops and drains.[32]

The high quantities of pasture pollen from our sites balanced with significant, even if low percentage of cereals, suggest either the spatial proximity of pasture and cereals, and/or the rotation of cereal and pasture. As noted above, there is no way at the moment to distinguish between these two possibilities, as the data cannot be so finely chronologically parsed. On the balance, however, particularly when combined with the presence of field drains, fodder crops and other evidence for intensive pasture maintenance, the data point towards convertible agriculture. Furthermore, our data may describe a spectrum of convertible farming rotations: in some locales, like San Martino, pasture may have been more extensive and/or quasi-permanent. Around Podere Terrato somewhat less land was given over to ley and/or more frequent rotation towards cereals, while at Colle Massari and 5th century AD Case Nuove present the opposite end of the spectrum, where the least land was given over to pasture and/or the land was more frequently rotated with grains.

5 Conclusions

Describing Roman agricultural regimes as ‘intensive’ or ‘extensive’ and reading these systems from field survey data, probably misrepresents realities that were not only more complex, but substantially differently conceived. The data from the Roman Peasant Project suggests that although a major moment of ‘intensification’ may have taken place in this region during in 1st century BC through early 1st century AD, its character and possibly its motivations were quite different than supposed. The almost complete absence of pre-2nd century BC

32 Kron (2000; 2005; this volume).

remains from the field survey and excavations suggest that occupation of this inland region really expanded after the establishment of the Roman colonies, like Roselle, on the coast. However, as the excavations of these five small sites suggest, a significant proportion of this expanded 'occupation' did not represent permanent settlements, that is, they didn't contribute to the demographic 'count'. Rather, they indicate an intensive moment of land management but under potentially lower demographic circumstances that might be suggested by the carpet of small, contemporary sites.

These sites were part of an agricultural strategy in which pasture and the management of pastoral resources were a significant part of what we have interpreted as 'intensification'. The possible alternation—either in space or time—of pasture with cereal crops suggests that convertible agriculture was practiced by land owners, and thus that pasture and pasture animals would have occupied a significant component of agricultural output. Indeed, given the preponderance of pasture pollen, it may be that pasture rotations were long in comparison with arable rotations, and thus that land placed into pasture would have occupied a significant percentage of a family's agricultural strategy in any given year.

This naturally raises the question of animal outputs and the uses to which pastoral products were put. Because these small sites were not major places of cooking and eating, the faunal assemblages are small and shed little light on diet/cooking in this period (see Table 7.1). The only site excavated by the project with significant faunal remains from this period is Pievina, where the late Republican phase probably represented a farm or *fattoria* with cistern, kiln, outdoor cooking area and granary (the house wasn't excavated).[33] These assemblages presented a faunal species profile similar to elite sites in the region with a heavy preponderance of pig (60.9 % NISP) followed by sheep/goat (26 %) and cattle (13 %).[34] Unlike elite sites, cattle and sheep were old at age of slaughter, suggesting they were used principally for traction/wool/milk. Although the sample sizes are too small for certainty, cattle may have been rather small in size. There are no indications in any species that cuts were exported for market sale, and herd sizes in all cases are probably small. This, as yet limited, data set suggests that the major pastoral animals sheep/goat and cattle were principally kept for wool, milk and traction, and that when consumed at the end of their lives both they and pigs provided a significant meat addition to even small-holders' diets.

33 Ghisleni et al. (2011).

34 See MacKinnon in Ghisleni et al. (2011, 120–129) for discussion and comparative data.

The short occupation of many of these sites likewise introduces the possibility that they were constructed only for the period in which these lands were under pasture. Ley farming could leave land under pasture for long periods, up to a decade if modern sources are reckoned any comparison. The very small finds collections and the extremely thin stratigraphy make it impossible to know if the real occupation on these sites lasted the several generations indicated by the ceramic evidence, or only several years. Thus, it is possible that what we have viewed as a coherent moment of intensification experienced by the whole region—and indeed visible in most central Italian surveys—is the accumulated residue of short-duration work huts, built to serve land in ley alternation.

The data from the Roman Peasant Project describe one sub-region of one area of central Italy. They do not, more than any other dataset from the Mediterranean, lend themselves to extrapolation over wider areas or exportation to other parts of Italy. They do, however, present the first coherent body of data that may indicate the practice of convertible agriculture by rural small holders. If this were true, it would suggest that these systems of crop/pasture rotation were not only practiced, but practiced by those with the least obvious causes to do so—small landowners in a somewhat liminal area under relatively low population conditions. In any event, the data point to deliberate strategies of intensive pasture maintenance, breaking down the presumed relationship between pasture and 'extensive' agriculture and offering alternative explanations for small-site scatters found in field survey.

PART 3

Rural Crafts

CHAPTER 8

Issues in the Study of Rural Craft Production in Roman Italy

J. Theodore Peña

1 Introduction

The past two decades have seen the investigation of Roman craft products come into its own as a field of study, as evidenced by developments such as the establishment in 1995 of the *Instrumentum* working group, with its semi-annual *Bulletin Instrumentum* and monograph series *Monographies Instrumentum*,[1] and the founding in 2007 of FACTA—*A Journal of Roman Material Culture Studies*, since reconstituted as HEROM—*Journal on Hellenistic and Roman Material Culture*.[2] Particularly important was the launching in 2001 of CRAFTS—*Structures, implantation, et rôle économique et position sociale de l'artisanat Antique en Italie et dans les Provinces occidentale de l'Empire Romain*—a four-year project supported by the European Commission under the *Culture 2000* initiative that involved regional studies of Roman craft production by research groups based in Germany, Austria, Belgium, Spain, France, Italy, Luxembourg, and Switzerland.[3] In Italy, specifically, Sara Santoro directed the PAAR (*Produzione Artigianale in Ambiente Rurale*) research initiative under the aegis of CRAFTS. This involved a comprehensive survey of the published evidence for craft production in Gallia Cisalpina (in effect, northern Italy) during the Roman period, producing, among other things, VOLCANUS, a searchable database for internal project use,[4] and a monograph of fundamental importance for the study of Roman-period craft production in Italy, *Artigianato e produzione nella Cisalpina: Parte I: Proposte di metodo e prime applicazioni*.[5]

1 http://www.instrumentum-europe.org/publications.html.
2 http://upers.kuleuven.be/en/serie/herom_journal_hellenistic_and_roman_material.
3 Polfer (2004).
4 Santoro (2004a, 58–63).
5 Santoro (2004a).

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2 Terminology and Definitions

We may begin this essay by defining what we mean by craft production. For this purpose it is useful to consider the definition put forward by Santoro:

> L'artigianato è il processo di lavoro attraverso cui persone dotate di uno specifico saper fare e direttamente operanti sulle materie prime o su prodotti semifiniti le trasformano in oggetti manifatturati secondo schemi e progetti predefiniti e condivisi dalla comunità, destinati ad una diffusione verso l'esterno dell'ambito di produzione.[6]

It should be noted that both PAAR and the broader CRAFTS initiative chose to exclude from the realm of craft production operations connected with the processing of foodstuffs—though not, for example, substances such as unguents and perfumes—on the grounds that these activities should be more properly regarded as aspects of agriculture.[7]

While I am generally content to employ this definition,[8] we might wish to make two modifications to it, the first fairly minor, the second of greater significance. First, we should admit to the realm of craft production operations concerned with the maintenance of craft products, such as the repair to a bronze vessel carried out by a tinker. Persons practicing these occupations have more in common with craftsmen than they do with other service providers, such as a tavern keeper or a veterinarian. Second, it seems to me questionable to exclude from craft production those operations connected with the construction, decoration, and maintenance of buildings. While it is not difficult to comprehend pragmatic reasons for excluding these operations from the realm of craft production, in that including them greatly expands and complicates any effort on the part of researchers to carry out a comprehensive study of craft production across a given region, it seems to me that they are an integral part of this kind of labour, differentiated from the realm recognized in Santoro's definition principally by the fact that the end product is fixed, requiring the labourers to travel to the location of use or consumption in order to produce the object in question,

6 Santoro (2004b, 24). "Craft production is the process of labour whereby persons possessing specific skills work directly upon raw materials or semi-finished objects, transforming these into manufactured objects according to preconceived templates and aims shared by the community, with these objects intended for distribution beyond the context of production".

7 Santoro (2004b, 24 and 35).

8 See Costin (2005, 1032–1034) for a definition of craft production articulated from the perspective of North American anthropological archaeology.

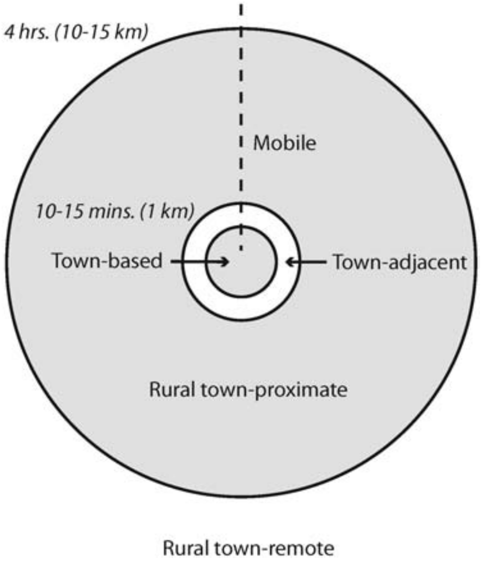

FIGURE 8.1 *Schematic representation of five craft production zones posited in text*

thereby effectively eliminating the element of distribution. In my view, while the various building trades do represent a distinct sector of craft production, they are, nonetheless, an integral part of it.

It is next necessary to define what we mean by 'rural' craft production. To do this I propose that locational considerations allow us to distinguish five distinct types of craft production, which I here term 'town-based', 'town-adjacent', 'rural town-proximate', 'rural town-distant', and 'mobile' (Fig. 8.1). Each of these would have been distinguished by the size of its local market, its access to elements of the regional transport system and raw material sources, and its freedom to situate and modify its locus of production or production facility.[9]

Town-based craft production involved craftsmen operating on a fixed basis at a locus of production situated inside the built-up area of a town. Craftsmen operating in such a location would have enjoyed ready access to a sizable local market, simplifying the task of distributing some significant portion of their output. To the extent that the town was also a node in the regional transport system they also would have enjoyed a favourable situation with regard to the extra-local distribution of their output. The fact that these craftsmen were

9 See the contributions by De Haas (this volume) and Witcher (this volume) for these issues.

situated in a place that was densely populated and intensively developed would have meant that, for those whose work involved a production facility, they often would have faced significant constraints in the placement, layout and sizing of this, and may well have been obliged to discard any production refuse at a substantial distance from the locus of production. Again, since towns would not in most cases have been sited with a view to the sources of the raw material required for craft production, town-based craftsmen involved in certain crafts would have faced high costs for or irregularities in the availability of their raw materials.

Town-adjacent craft production refers to production at loci situated within the band of territory that lay immediately outside the built-up area of towns in which there was a concentration of craft activity.[10] I would suggest that these zones tended to be narrow enough to permit craftsmen working in such an area to move conveniently back and forth between a residence located inside the town and the locus of production, while also permitting residents of the town to travel conveniently to the locus of production in order to obtain the items manufactured there or information about these. For this I would suggest a walk of perhaps no more than 10–15 minutes, a figure that we can translate into a distance of c. 1 km along a road or track emanating from a town. This arrangement allowed for the literal marginalization of operations that were dangerous and/or noxious, such as the firing of kilns and furnaces and the tanning of hides. As with town-based craftsmen, craftsmen operating in these areas would have enjoyed convenient access to both a sizable local market and the regional transport network for the extra-local distribution of their products. In contrast with town-based craftsmen, they would have had greater opportunity to locate and modify their production facilities, to obtain certain raw materials by harvesting or extracting these directly, and to dispose of production refuse at or near the locus of production.

Rural town-remote craft production involved craftsmen operating on a fixed basis at a locus of production situated so far from any town that it would have been effectively impossible for them to transport their products there by themselves for marketing, either by retailing these in town or by depositing them with another party for eventual retail. For our present purposes we can assume that this limit equalled the distance that could be travelled in one-half day's journey—let us say c. 4 hours—by pack animal or cart, a figure that we

10 I here employ the term 'town-adjacent' rather than the more expected 'suburban' on the assumption that the latter term should be reserved for reference to areas adjacent to high-order cities.

can translate into a distance range of c. 10–15 km, depending upon the terrain and the nature of the road system.[11] For craftsmen of this kind, local demand would have been modest due to the low population density of the surrounding area and perhaps also to a somewhat lower standard of living and, along with this, a lower rate of per capita consumption of craft goods relative to towns. The marketing of output to large, dense, and somewhat distant bodies of consumers would have required costly, and perhaps complicated-to-arrange forms of distribution, and, perhaps in some cases (including Rome, specifically), the additional cost of municipal customs duties. In many cases these craftsmen's locus of production would have lain a great distance from any element of the regional transport network, rendering more costly and complicated the extra-local distribution of their products. On the positive side, the substantially lower population density and level of development would have meant—in theory, at least—that there was some flexibility in the situating of the locus of production or production facility, permitting this to be placed at or close to an important source of raw material and/or an element in the transport network. Again, this circumstance would have permitted craftsmen considerable latitude when it came to determining the layout of and modifying or expanding a production facility, in the conduct of certain noxious, dangerous, and/or potentially laborious operations, such as firing a kiln or furnace, and in the disposing of production refuse.

Rural town-proximate craft production would have involved craftsmen who operated on a fixed basis at a locus of production in the zone situated between the town-adjacent and rural town-remote zones, thus between a c. 10–15 minute walk and a c. 4-hour journey by pack animal or cart, or c. 1 km and 10–15 km depending upon terrain and the road system. On account of their location craftsmen operating in these areas would have enjoyed many of the advantages associated with both town-adjacent craftsmen and town-remote craftsmen, while avoiding some of the disadvantages associated with these. Most importantly, their proximity to a town would have made it possible for them to transport their products there by themselves for marketing.

Mobile craft production would have involved craftsmen who operated at multiple loci of production, generally not provided with permanent production facilities, which might have been situated in any one or in two or more of the four zones defined above. This form of production would have been more common in association with crafts for which the product could not be moved,

11 See Bintliff (2002, 216–217) for the significance of the one-half day journey limit in relation to the marketing of agricultural produce.

as would have been the case with the various crafts related to the construction and decoration of buildings, or forms for which the product could be moved only with substantial difficulty, particularly in cases where the requisite raw materials were widely distributed and/or were themselves difficult or costly to transport, such as the manufacture of bricks, tiles, and *dolia*. It also would have been more common with crafts for which there was a low level of demand, or that required little in the way of production facilities and equipment.

It is not difficult to see how this simplifying scheme might be modified in the interest of obtaining a model bearing closer resemblance to what might have been the Roman reality—for example, through the adjustment of the distance threshold posited for the boundary between the town-adjacent and rural town-proximate zones and/or the rural town-proximate and the rural town-remote zones, or by taking into account the possibility of distribution via some form of water-born transport—or elaborated, for example, by recognizing production in or adjacent to a lower-order centre as a sixth type of craft production.[12]

3 The Dynamics of the Operation of Rural Craft Production

We can now focus our attention on the three types of rural craft production—namely that in the rural town-proximate and rural town-distant zones, and mobile craft production when it implicated either or both of these zones. We can imagine that in such areas the lower population density and the more limited development of commercial forms of economic activity led to lower demand density for craft goods and a significantly higher level of self-supply on the part of residential/economic units for many categories of essential material culture, the manufacture of which did not require highly developed skills, complex and/or costly tools and facilities, and/or raw materials not available locally. We can thus imagine that the mastery of skills for basic construction operations, woodworking skills, skills for the production of textiles and, along with these, garments, as well as other fibre objects, such as baskets, mats, cord, and so forth, as well as basic leatherworking skills, would have been widely diffused among the residential/economic units.

The wide diffusion of manufacturing skills in these areas would have meant that many residential/economic units engaged in subsistence agriculture or agricultural production aimed in substantial measure at the market would have

12 See the contributions by De Haas (this volume) and Santoro (this volume) for the economic role of minor centres.

been positioned to engage to some greater or lesser degree in certain kinds of manufacturing activity also aimed at the market (hence craft production by the definition employed here). Activity of this kind would have been facilitated by the uneven seasonal labour demands of agriculture, as well as the presence of individuals within residential/economic units who could not fully participate in agricultural labour due to domestic responsibilities, youth, old age, or infirmity. The inclination for a residential/economic unit to engage in or to expand its involvement in this kind of activity might have been promoted by any one of several factors or some combination of these.

A variety of factors might also have inspired one or more members of the residential/economic unit to shift over to full-time craft activity, or to split off from the unit and to operate as independent, full-time craftsmen. We would expect such instances to be accompanied by on-going and perhaps also intensified investments in the production and/or acquisition of craft tools, production facilities, and means for the distribution of products, resulting in some cases in the development of extensively-equipped production facilities. The existence of such facilities would have worked to promote the on-going existence of full-time craft production at that location, as they would have served to render this kind of activity more secure and remunerative, promoting the renewal and continuation of the production group, as well as the development and stabilization of a local market for the kind of craft goods that it produced, or inspired the owner of the production facility to seek to rent or sell the facility to new craftsmen whenever a production group terminated its activities at that facility for whatever reason.

This represents a gradualist, organic scenario for the emergence of full-time craft production in rural areas. In contrast, we can also posit the existence of cases in which either an individual or two or more individuals collaborating as a *societas* (partnership) determined to construct a craft production facility at a particular location *ex novo* and to staff it with a production group for the purpose of production for the market. A facility of this kind might have been incorporated within, annexed to, or associated with some other sort of establishment, such as a villa, or it might have been a stand-alone craft production facility. It might have been operated by the owner/investor and staffed with members of his or her *familia*, perhaps including craftsman slaves and/or freedmen, as well as wage labourers, or rented to an individual or group of individuals who would have operated the facility, staffing it with members of their *familia* and/or wage labourers. This scenario presupposes a significant investment of capital for the acquisition of the land on which the production facility was to be situated and perhaps also for the land on which one or more raw material sources were located, in cases in which these were not already

owned by the owner/investor, for the construction and equipping of the facility, and for the provision of the work force. It also presupposes the investing of substantial effort to establish the production facility and supervise the ongoing operation there of the production group either by this individual or by one or more of his or her family members, *amici*, slaves, freedmen, or clients.

An effort of this kind would appear to presuppose the intention on the part of the owner/investor that the production group that operated at the facility would engage in production on a certain scale, implying intensive production, quite possibly aimed in significant measure at an extra-local market or markets. A production group aimed at supplying markets of this size (in terms of number of consumers) might in some cases have engaged in specialized production, that is, the production of just one kind of item or a limited suite of items. Specialized production, in turn, might well impose certain requirements (while, at the same time, removing or loosening others) with regard to type and amount of production equipment, size of work force, type, range and distribution across the work force of production skills, access to and supply of raw materials, and access to a distribution network.

It is not difficult to imagine how the disappearance or reversal of several of the factors indicated in the preceding paragraphs as working to promote the emergence of part-time, full-time, and specialized craft production in rural areas would serve to depress or lead to the demise of these activities in rural areas.

4 The Evidence for Rural Craft Production

The extent to which we can elucidate various questions regarding rural craft production is determined by the evidence at our disposal. While the textual and representational evidence provide some qualitative insights into craft production, this is for the most part highly uneven, difficult to place chronologically or geographically, relates for the most part to towns, constitutes what is effectively a closed set of materials, and is difficult to combine in any useful quantitative way with the large and more continuous body of archaeological evidence.

The category of archaeological evidence for craft production consists of the following:[13]

13 See Santoro (2004a, 36–38) for a substantially similar representation of the archaeological evidence for Roman craft production.

1. Production facilities, which may include buildings and various kinds of fixtures, such as basins, furnaces, kilns, prepared surfaces, and drains;
2. Production tools and equipment;
3. Raw materials (including, for some crafts, used items or items with production defects collected for recycling) or, in the case of the manufacture of certain items in stone, such as grain mills and sarcophagi, items partially finished at the quarry site before distribution to the final locus of production;
4. Production waste, such as wood, bone, or leather off-cuts, slag, and ash from the firing of furnaces and kilns;
5. Discards, that is craft items discarded either in the course of or at the conclusion of the manufacturing process on account of defects;
6. Finished craft items.

These last are in some very rare instances recovered unused in contexts that relate to their distribution, such as a warehouse, the wreck of a merchant ship, or a retail shop. Most often, however, they come from contexts that relate to their use after their acquisition by the consumer, their discard following the end of their use life, or their disturbance and re-deposition following discard.

Santoro and her PAAR research group have done the discipline a great service by drawing up and publishing tables that diagram the production cycle for craft goods manufactured in a wide array of materials, including ceramic, glass, bronze, lead, tin, silver, gold, iron, wood, bone/horn/ivory, textile, stone, and plaster.[14] In each case these indicate the steps involved in the manufacturing process and the various raw materials, facilities, tools, products, and waste materials associated, highlighting those items apt to be preserved in the archaeological record.

Archaeological evidence for craft production is reasonably abundant and widely distributed across time and through space, including at loci of production. It is not, however, without substantial limitations. First, much of the evidence is of fairly low quality, as a consequence of which it is often impossible to contextualize and/or date as rigorously as one might wish, and, in not a few cases, has gone unrecognized or been misinterpreted. Second, due to the inherently fragmentary nature of the evidence, it is often difficult to interpret. Classic examples of this problem include the uncertainty regarding the implication of the recovery in some particular location of a small number of loom

14 Santoro (2004a, 38–50).

weights or a few shards of misfired pottery. Should these be taken as evidence for textile or pottery production at that location or somewhere in the immediate vicinity, or are these simply sporadic materials? In many cases in which the evidence does permit a researcher to conclude with an adequate degree of certainty that items of one sort or another were manufactured in a particular location, some of the basic attributes of this activity—such as whether it was being carried out for purposes of self-supply or for the market, and thus craft production, as here defined—remain entirely unclear. Most disappointing in this regard is the extreme difficulty in most instances of drawing any secure inferences regarding the size and nature of the work force and the nature of its relation to the production facility.

Particularly problematic is the pronounced differential in the representation of the various crafts. Some crafts, such as woodworking, basket making, textile production, and leatherwork, have notably low archaeological profiles due to the fact that they required little in the way of dedicated structures or fixtures, while employing raw materials, generating production waste, and yielding finished items not normally susceptible to preservation. In contrast, the two main forms of ceramic production—pottery production and the manufacture of architectural ceramics—tended to generate relatively robust archaeological signatures across all six categories of evidence and are as a consequence very substantially over-represented in the archaeological record relative to every other craft. The ubiquity of evidence for pottery production, specifically, is illustrated by the fact that Gloria Olcese, in her recently published gazetteer of pottery production sites in Toscana, Lazio, Campania and Sicilia dating to the period c. 350 BC to AD 50 was able to document nearly 700 such facilities.[15] The two other pyrotechnological crafts—glass making and the suite of metal working crafts—enjoy something of an intermediate position, determined in large measure by the fact that both discards and finished items were regularly recycled. The remaining major crafts, stone working and the working of bone, horn, shell, and ivory, may also be assigned an intermediate position, the one because it was not widely practiced, the other because it required little in the way of dedicated structures or fixtures.

15 Olcese (2012, vii).

5 Pottery Production

In this section I turn my attention to pottery production as the craft for which we have by far the most complete picture. To do this I will offer brief descriptions of four representative cases of rural pottery production from Central Italy selected with a view to illustrating some of the principle modes of production attested, types of markets for which pottery was produced, variability in the nature of the archaeological evidence at our disposal, and the analytical possibilities and limitations associated with these various kinds of evidence (Fig. 8.2). All four cases, which are here considered in chronological order, are instances of rural town-proximate production, as rural town-remote and mobile production are very poorly attested in the archaeological record. I have limited my selection to instances of the production of domestic wares—that is, tablewares, cookwares, and utilitarian wares—passing over those involving more than the incidental production of amphoras so as to avoid cases with particularly strong linkages to agriculture.

While it remains essential for scholars of craft production in rural areas to take advantage of the wealth of evidence for pottery production, it is important to recognize several ways in which this craft likely differed to some greater or lesser extent from the other crafts practiced in these areas:

1. Pottery manufacture involved a series of complex operations that necessitated substantial and complex fixtures, tools, and equipment, the use of which required highly developed skills. Further, the production of an item from start to finish generally required several days, many of the operations had to be carefully monitored and timed, and there was considerable risk that objects would be ruined if these requirements were not respected. For these reasons, pottery manufacture was presumably better undertaken by production groups composed of multiple persons and made up at least in part of full-time craftsmen rather than by a solo or part-time craftsman. These characteristics presumably served to distinguish pottery manufacture from several other crafts, such as basketry, leatherworking, textile manufacture, bone working, and much wood working, which had low overhead requirements, lower or less variegated skill requirements, and more relaxed scheduling requirements, and could thus be conveniently undertaken by a solo craftsman and/or by craftsmen working on a part-time or seasonal basis.
2. The technical requirements of pottery manufacture meant that it was undertaken almost exclusively at production facilities that included buildings or otherwise roofed spaces, various special purpose fixtures,

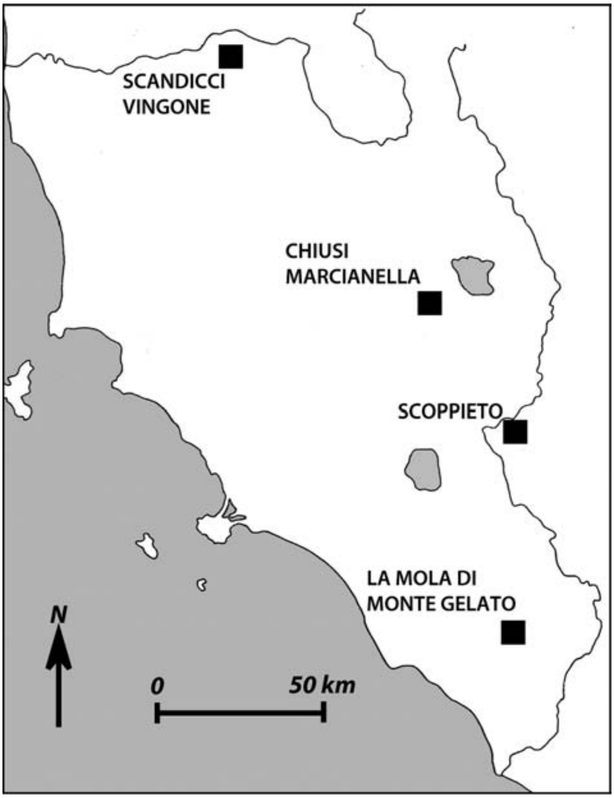

FIGURE 8.2 *Map of Central Italy showing locations of four representative cases of pottery production discussed in text*

such as kilns and levigation tanks, and various items of tools and equipment. On account of this circumstance pottery producers would have had impetus against shifting the locus of their activity, while the owner of a pottery production facility, if not a producer him- or herself, would have had strong motivation to derive some benefit from his or her property by arranging for its continuous use. These factors would have meant that, in comparison with many other crafts, there would have been a restricted number of loci of pottery production, that there would have been a high level of stability in the operation of production groups at these locations, and that these would have served as loci of pottery production for relatively long periods of time.

3. Many operations involved in pottery manufacture required differing degrees of strength, levels of skill, and amounts of labour, and could, in some cases, be scheduled somewhat flexibly. There was thus some logic to

assigning these to different workers, and pottery production groups may have found it convenient to act on this circumstance by taking advantage of the pool of part-time and seasonal unskilled labour that would have been widely available in rural areas to carry out certain operations such as the procuring of clay and fuel, paste preparation, and the distribution of finished products.

4. There would have been strong linkages between pottery manufacture and agriculture. Pottery producers manufactured the most important kinds of containers employed for the short-term storage and packaging of olive oil and wine, two of the most important agricultural products. In addition, they may have made extensive use of agricultural by-products for fuel, including chaff, olive clippings, olive pressings, and perhaps also dung. There would thus have been strong advantages for agricultural producers to have one or more pottery producers located somewhere in their vicinity and for pottery producers to be located near agricultural producers.
5. The principal raw material for pottery manufacture—clay—is widely, though somewhat discontinuously available in most regions of Italy. The processing operations required for clay were relatively straightforward from a technological point of view, and our evidence indicates that these were undertaken at pottery production facilities rather than at specialized primary production facilities, as was the case with the raw materials for glass working, the manufacture of metal objects, and leather working. Clay is heavy, was used in large quantities, and is onerous to transport in comparison with the products of pottery manufacture. There would thus have been impetus for pottery production facilities to be established at or near clay sources. This consideration would have favoured the siting of production facilities in certain rural areas and against the siting of them at many towns, which either lay far from any clay source or where land use considerations rendered clay extraction impractical or impossible.
6. Pottery fulfilled a wide range of functions that required distinct performance properties (resistance to the elements, permeability/impermeableness, lightness, robustness, resistance to thermal stress/shock, ability to accept and retain an attractive slip finish) that were in significant measure a function of the specific composition of the clay and/or tempering material utilized for the ceramic paste with which they were manufactured. There would thus have been in some cases an impetus for pottery producers operating at a particular production facility or in the vicinity of a particular clay source to engage in the manufacture of a functionally restricted range of items, for example, storage jars, cookwares, gloss-slipped tablewares, water jars, or amphoras. This specific impetus

towards specialized production would have been absent in many other crafts, namely those for which there was little significant variability in the quality of raw materials and those that employed non-local raw materials, such as glass making, the production of metal items, and leather working.

7. Pottery manufacture requires little in the way of raw materials that would not have been locally available in most parts of Italy—metals for the very rare instances in which production involved glazing, perhaps also pitch for the lining of amphoras—meaning that there was little impetus for pottery producers—in contrast with many other kinds of craftsmen—to take into account the supply of materials from beyond their immediate locale. This might have rendered irrelevant some of the advantage to be had from locating production facilities in towns, which, generally speaking, would have been better placed than rural areas to enjoy access to a secure supply of non-local raw materials.
8. The products of pottery manufacture have a low value per unit and are for this reason best produced and distributed in volume. Pottery is relatively bulky, yet, at the same time, fragile in comparison with many other craft items, such as basketry, leatherwork, textiles, and small items in wood, metal, and stone. This would have meant that it was particularly desirable for pottery producers to be located close to sizable concentrations of demand such as could be found in towns and cities or, failing that, close to elements of the transport network that could be employed to distribute their products to sizable concentrations of demand securely and at low cost.

Let us now turn to the four representative cases.

Case 1: Chiusi Marcianella

Excavations carried out from 1987 to 1991 under the direction of Giuseppe Pucci and Cynthia Mascione over a continuous area of c. 350 m^2 uncovered a substantial portion of a pottery production facility at Marcianella, 2.5 km southwest of Chiusi (Etruscan Clevsin, Roman Clusium) (Figs. 8.2, 8.3 and 8.4).[16] The full extent of the facility was not determined, and its context within some broader settlement landscape is unclear. It stands at the foot of a low hill made up the Pliocene marine sandy clay that outcrops widely in this area.[17]

16 Pucci and Mascione (2003); Olcese (2012, 101–107 Site T011).

17 *Carta geologica d'Italia, foglio* 121 Montepulciano, formation P_s^{2-1} (*Sabbie e sabbie argillose con molluschi*).

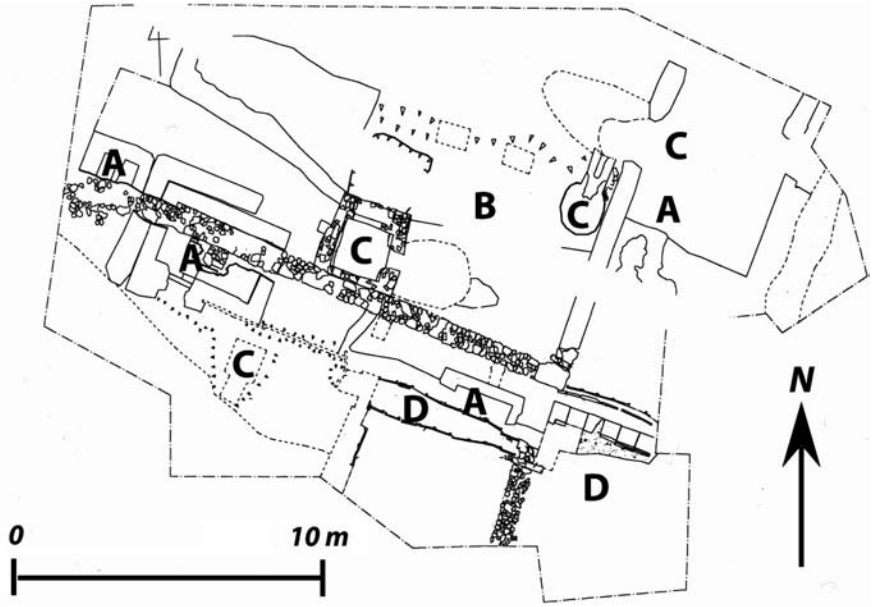

FIGURE 8.3 *Plan of excavation of Chiusi Marcianella pottery production facility (after Pucci and Mascione (2003, Fig. 36)). A: Phase 1 kiln; B: Phase 2 structure; C: Phase 2 kiln; D: Phase 2 clay processing fixture.*

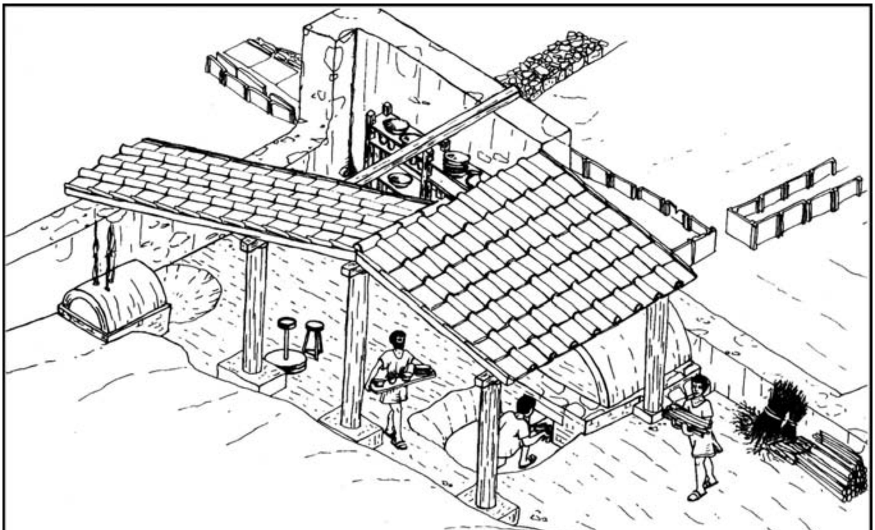

FIGURE 8.4 *Cutaway reconstruction of Chiusi Marcianella pottery production facility from northwest (c. 150–100 BC) (Pucci and Mascione (2003, Fig. 37))*

Preservation was sufficient to allow the excavators to reconstruct in detail a sequence of occupation that saw the facility active from the end of the 3rd century BC to the early 1st century BC.[18] This can be divided into two phases corresponding roughly to the first and second halves of the 2nd century BC. The first phase saw the construction first of two kilns, the addition of a third, then the demolishing of all three along with construction of a fourth kiln, with all of these apparently standing in the open. The second phase saw the destruction of the one remaining kiln, the construction of a modest building inside of which were built two new kilns, and the construction of clay processing fixtures outdoors to the south of the building. This was followed by the reconstruction of one of the two kilns, the construction of a third kiln to the southwest of the building, and finally the destruction of one of the kilns inside the building and its replacement by a larger kiln in the same location. The facility was then abandoned.

Through careful study of stratified groups of discard pottery recovered at the facility it was possible to determine the suite of wares and forms fired in each of the kilns and to reconstruct the output of the one, or perhaps two successive production groups that operated at the facility as this changed over circa one hundred years.[19] In the first phase this consisted of a strikingly wide array of wares, including medium-quality black gloss Ware, North Etrurian Red-Slip Ware, thin-walled ware, and commonware, cookware, and loom weights. In the second it consisted of a low-quality black gloss ware in a different and more restricted repertoire of forms, thin-walled ware, commonware, and cookware, all again in a new repertoire of forms, and the limited manufacture of Dressel 1 amphoras. The presence of *prae-cocturam* Etruscan graffiti on a group of coin banks from this phase indicates that at least one of the workers was an Etruscan-speaker who was at least marginally literate.

A program of compositional analysis indicated that the black gloss ware, North Etruscan Red-Slip Ware, commonware, and amphoras were manufactured with Pliocene marine clay likely excavated at or near the facility.[20] The cookware and thin-walled ware, in contrast, were manufactured in a coarser, ferruginous paste containing minerals of volcanic origin, which increase resistance to thermal stress. This must have been obtained from a deposit of argillaceous sediment containing materials originating in either the Volsinian or the

18 Pucci and Mascione (2003, 17–72).

19 Pucci and Mascione (2003, 75–270).

20 Pucci and Mascione (2003, 275–314).

San Venanzo volcanic complex, the nearest occurrences of which can lie no closer than c. 20 km to the south in the vicinity of Fabro Scalo.[21]

It seems likely that the production group or groups that operated here supplied a market comprized in large measure of consumers of modest means living at Clevsin and in its environs, perhaps in substantial measure beneficiaries of the emancipation of the *lautni* (dependent agricultural labourers) that literary sources indicate occurred at Clevsin during the 2nd century BC. Interestingly, the production group's activity appears to have been characterized in the later 2nd century by an effort to increase output through the standardization of forms, a lessening of concern for quality of form and finish, and perhaps also some streamlining of firing operations.

Case 2: Scandicci Vingone

In 1980 the then Soprintendenza Archeologica della Toscana carried out rescue excavations at a ceramic production facility on the south (left) bank of the Torrente Vingone, six km west-south-west of Florence (Roman Florentia) (Fig. 8.2).[22] This intervention, under the direction of Giuliano de Marinis, involved the excavation of 12 test trenches dispersed across an area of c. 2400 m^2 (Fig. 8.5). The full extent of the facility was not determined, and its context within the broader settlement landscape is not known. It is situated at the edge of the Firenze—Prato—Pistoia floodplain, at its juncture with the Colline della Romola, the heights to the south, and sits atop a deposit of quaternary alluvial sediment.[23]

Due to the damage done to the site by construction work prior to the intervention, the shortage of time and resources, and the dispersed arrangement of the trenches it was not possible to determine the layout of the various elements that made up the production facility.[24] Excavation did, however, uncover the remains of one kiln, traces of two additional possible kilns, and a possible clay pit. The facility's period of operation appears to have extended from c. 20 BC to AD 20. This would have corresponded to the second and third generations of the existence of the nearby *colonia* of Florentia, probably established between 59 and 41 BC.

21 *Carta geologica d'Italia*, *foglio* 130 Orvieto, formation ts (*Tufi stratificati con lapilli, scorie ed inclusi lavici*).

22 Shepherd et al. (2008), Olcese (2012, 39–43 Site T049).

23 *Carta geologica d'Italia*, *foglio* 106 Firenze, formation q (*Depositi fluviali di ciottoli e argille sabbiose*).

24 Shepherd et al. (2008, 15–57).

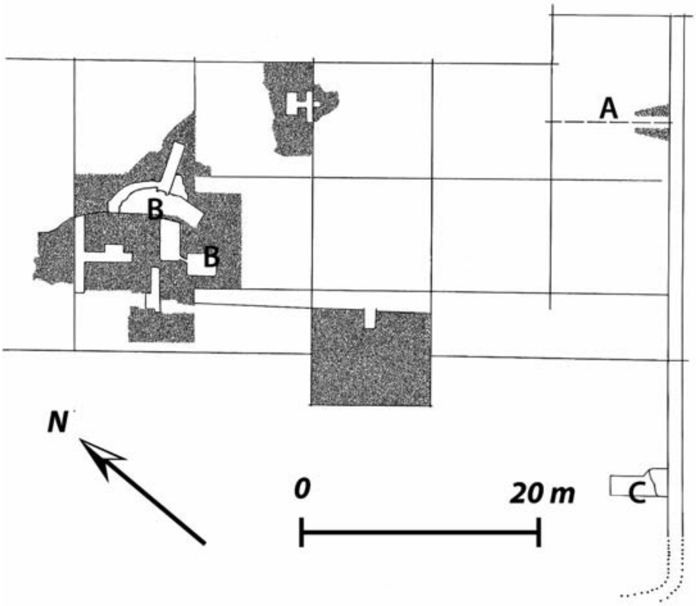

FIGURE 8.5 *Plan of excavation of Scandicci Vingone pottery production facility (after Shepherd et al. (2008, Fig. 13)). A: kiln; B: possible kiln; C: possible clay pit.*

The disturbed nature of the deposits and the presence of a substantial amount of ceramic material manufactured elsewhere complicated the effort to determine the range of items turned out at the production facility. There is reasonably secure evidence, however, for the manufacture of a broad range of both pottery and architectural ceramics, including thin-walled ware, commonware, cookware, amphoras—including the Dressel 2–4 and various small, flat-bottomed containers—loom weights, roof tiles, and bricks.[25] Of the 52 stamped tiles and 4 stamped bricks recovered, 22 bear the stamp of Sextus Avidius Maxsimus, 9 the stamp of an individual whose name is abbreviated *CAH*, and 8 the stamp of a certain Cassius, suggesting that one or more of these men owned and/or operated the facility or some part of it.

A program of compositional analysis identified six fabric groups among the items produced at the facility.[26] The thin-walled ware, commonware, and amphoras were manufactured in four related pastes probably produced using alluvial clay that was excavated on or near the site, while the architectural

25 Shepherd et al. (2008, 65–215).

26 Shepherd et al. (2008, 241–250).

ceramics were manufactured in a paste that involved the addition to this clay of *chamotte*—pulverized ceramic. The cookwares, in contrast, were manufactured in a coarse, ferruginous paste containing materials of ophiolitic origin. The nearest documented deposit of this kind occurs at Impruneta, 10 km to the southeast, where it has been intensively exploited by ceramic producers in the modern period.[27]

The organization of the production that took place at this location is entirely unclear. It may have involved either a single production group turning out a wide range of products at a single facility, or multiple production groups that manufactured a narrower range of products at one or more separate facilities. Whatever the case, it appears likely that this activity was primarily aimed at supplying the inhabitants of Florentia and the colonists living in its territory. Noteworthy is the fact that operations at this location did not involve the manufacture of any gloss-slipped tablewares, presumably due at least in part to the emergence during the third quarter of the 1st century BC of the Italian terra sigillata industry at Arretium, 80 km up the Via Quinctia from Florentia.

Case 3: Scoppieto

Excavations under the direction of Margherita Begamini have uncovered a substantial portion of a ceramic production facility near Scoppieto, 11 km southwest of Todi (Roman Tuder) (Fig. 8.2).[28] While the area opened up as of 2006 came to 2300 m^2, the full extent of the facility has not yet been determined, and its context within the broader settlement landscape remains unclear (Figs. 8.6 and 8.7) The facility stands near the crest of a hill 800 m to the south of the Tiber, at 460 m above sea level, or 320 m higher than the Tiber in this area. It sits atop an exposure of Pliocene marine clay that outcrops in a limited number of locations along the edges of the Tiber Valley.[29]

The facility, which operated for a period of circa one hundred years, extending from the BC/AD juncture through the early 2nd century AD, represents an exceptionally important example of a large-scale pottery production facility.[30] The compound, which measures 30 m by 30 m, consists of two long, narrow North—South buildings that faced each other across a courtyard. The West Building contained a kiln at its south end and a pair of basins for clay mixing

27 *Carta geologica d'Italia, foglio* 106 Firenze, formation ε (*Gabbri*).

28 Bergamini (2007, 2011 and 2013).

29 *Carta geologica d'Italia, foglio* 130 Orvieto, formation P_a^{3-2} (*Argille e argille sabbiose grigiastre od azzurrognole*).

30 Bergamini (2007, 57–70). Neither Begamini (2011) nor Bergamini (2013) were available to the author for the preparation of this essay.

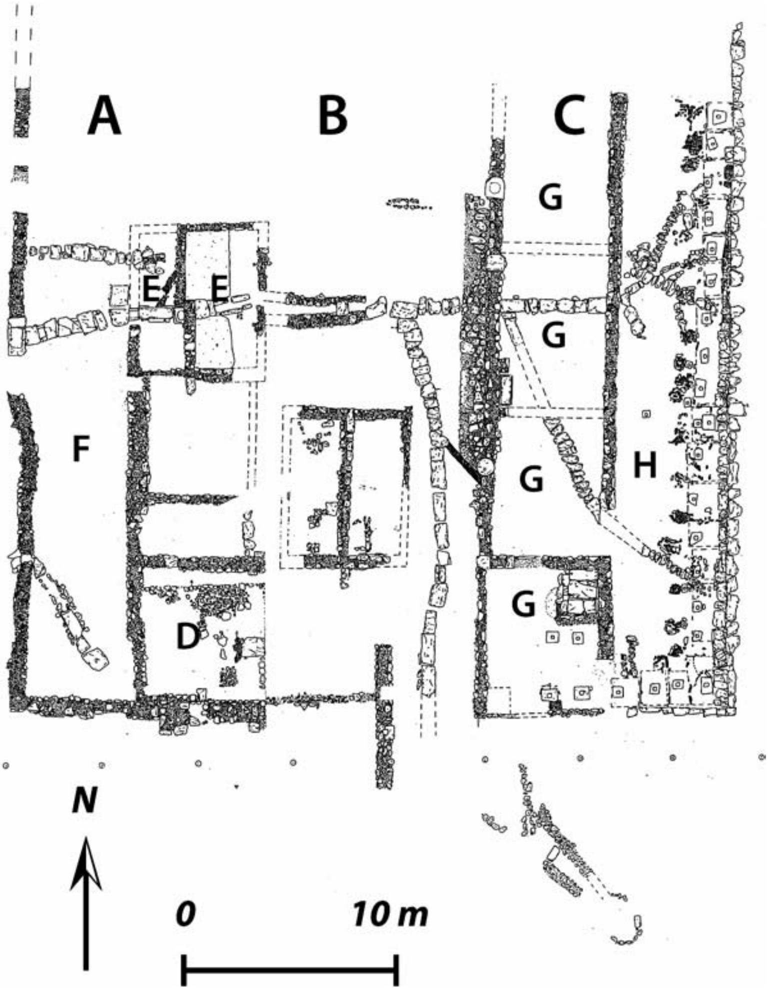

FIGURE 8.6 *Plan of excavation of Scopietto pottery production facility (after Bergamini (2007, Fig. 5)). A: West Building; B. courtyard; C: East Building; D: kiln; E: basin; F: possible drying area; G: work room; H: potting room.*

and or slipping near its north end, with its entire west side taken up by a long narrow room that might have served as a drying area.

The west half of the East Building was given over to four sizable work rooms. This structure's entire east side consisted of a long, narrow potting room that contained a row of no fewer than 24 potter's work stations that measure from c. 1 by 1.2 m to c. 1.2 by 1.5 m. Each was equipped with a perforated travertine block set into the pavement, which must have served as the mount for a potter's wheel, and a small hearth.

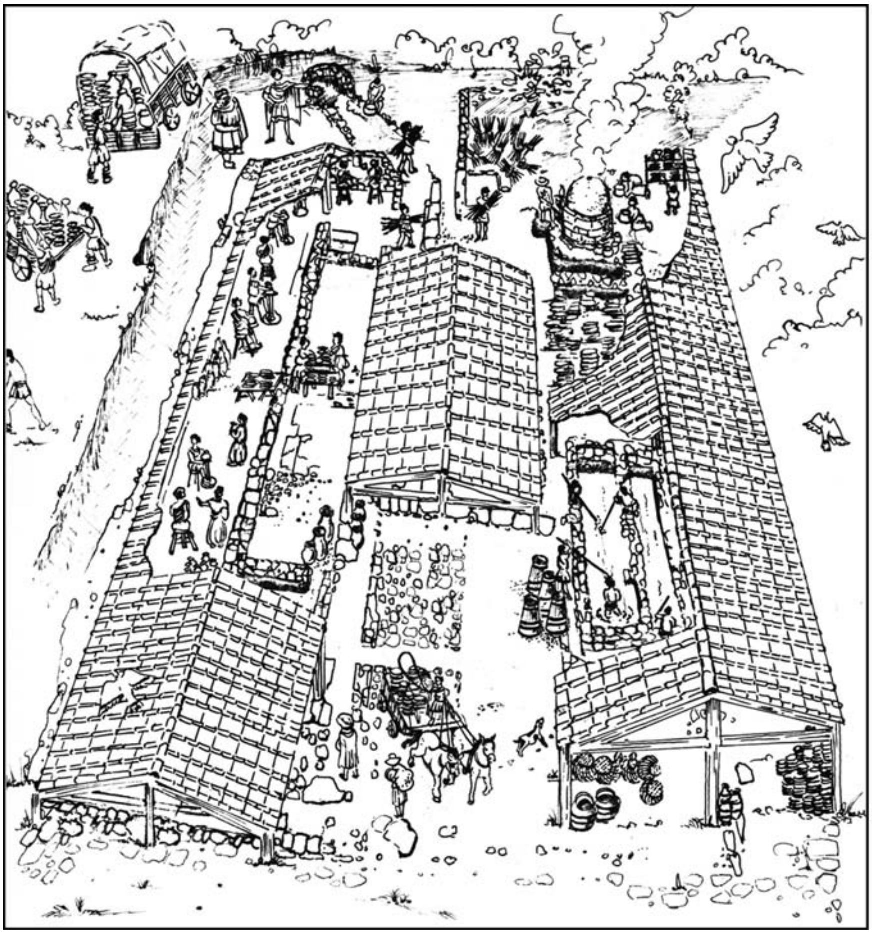

FIGURE 8.7 *Cutaway reconstruction of Scoppieto pottery production facility from north* (*after Bergamini* (*2007, Fig. 6*))

From discards it is evident that the production group or production groups active at this facility concentrated almost exclusively on the manufacture of Italian terra sigillata and lamps.[31] The large corpus of maker's stamps recovered provides important evidence regarding the organization of production, as well as variation in the intensity of operations.[32] While the marks of over 50 makers are attested, those of two men, Lucius Plotidius Porsilius and Lucius Plotidius Zosimus, perhaps brothers, are dominant, and Bergamini has inferred that

31 Bergamini (2007, 60–61).

32 Bergamini (2007, 61–64).

they were likely responsible for the construction of the facility. The forming of vessels was probably carried out by separate production groups linked to the various makers, each of which stamped its products, while paste and slip preparation, drying and firing were undertaken communally. Precisely how operations were organized, however, remains unclear. Did each of the makers produce for his own account, or did they work under contract with another of the makers?

The stamp evidence suggests that output was at its height from the AD 40s to the AD 90s, after which it declined. Production of Italian Sigillata appears to have ended during the period AD 100–120. At this point the structures were converted to use as residences, with low-level production of cookwares and commonwares taking place in and around the complex into the 3rd century AD.

Scoppieto constitutes a paradigmatic case of large-scale, specialized production aimed at extra-local markets, with Rome presumably chief among these, considering the facility's location just a stone's throw from the Tiber. The distribution of the various maker's stamps associated with the facility confirms this assumption.[33] That production was not just large-scale, but also intensive is suggested by the hearth located at each potter's work station, as these presumably served to facilitate the continuation of operations through the winter months. The local, fine-grained, calcareous marine clay is ideal for the manufacture of gloss-slipped tablewares, as it is for lamps, and the choice of this specific location for the construction of the facility was doubtless determined by this consideration. Interestingly, the facility is situated atop the outcrop of this type of clay situated furthest upstream in the Tiber Valley, suggesting that its siting was determined not just by the advantages that the location offered for distributing pottery down the Tiber to Rome, but also up the Tiber to supply markets in Umbria. It is plausible to suggest that the bulk of the facility's products were distributed by first being taken downstream by boat or moved overland to Palianum, a major port at the confluence of the Fiume Paglia and the Tiber, 7.5 km southwest of Scoppieto. Here they could have been combined with a stream of similar wares brought down the *Via Cassia* from Arretium, and then shipped down the Tiber to Rome.

Case 4: La Mola di Monte Gelato

Excavations carried out from 1986 to 1990 by a team from the British School at Rome under the direction of Tim Potter uncovered a large portion of a richly

33 Bergamini (2007, 64).

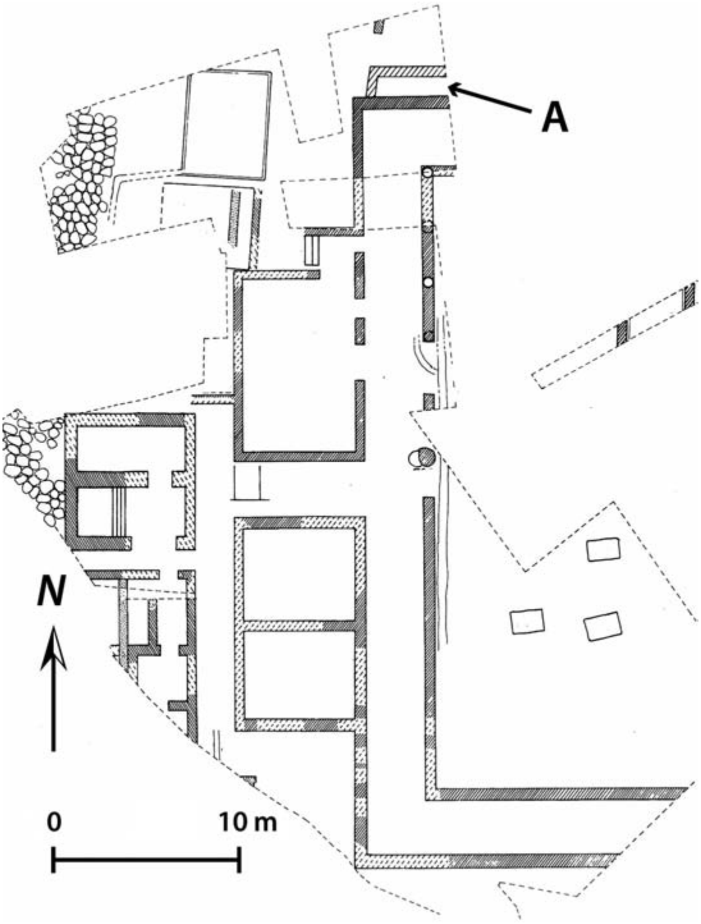

FIGURE 8.8 *Plan of excavation of villa at La Mola di Monte Gelato. (after Potter and King (1997, Fig. 13)). A: location of basin containing pottery with manufacturing defects.*

appointed villa at La Mola di Monte Gelato, seven km south-south-east of Nepi (Roman Nepet), on the north (left) bank of the Fosso Treia.[34] (Figs. 8.2 and 8.8) The villa, constructed during the late 1st century BC, was probably the country residence of a member of the economic and perhaps also social elite, who dwelled in Rome, perhaps Caius Valerius Faustus, a *mercator bovarius*, whose epitaph was recovered in a late Roman lime kiln uncovered at the site.[35]

34 Potter and King (1997).

35 Potter and King (1997, 202–204 and 421).

A refuse dump recovered in a fishpond probably deposited during the AD 120s or 130s contained several shards of misfired pottery.[36] These included examples of colour-coat ware, cookware, and jars in a moderately coarse fabric, and it seems highly likely that a production group that manufactured all three kinds of pottery was active somewhere in the immediate vicinity. The colour-coat ware was presumably manufactured from Pliocene marine clay obtained from a small outcrop exposed in the floor of the Treia Valley, one of which has been documented 2 km to the northeast of the villa.[37] The cookware and perhaps also the jars may have been manufactured from a localized deposit of volcanic material that weathered into a coarse, ferruginous clay somewhere in the vicinity of the villa.[38] This appears to be an instance of a pottery production group operating at a villa as part of the suite of economic activities conducted on the estate attached to it, manufacturing a mixed array of tablewares, cookwares, and utilitarian wares, presumably for self-supply—not just of the villa, but also conceivably for the owner's residences in Rome and elsewhere—and for sale on the local and/or regional market.

Among the vessels from this deposit is the so-called Stork Vase.[39] This vessel, which probably dates to the early 2nd century AD, is a tall, colour-coat ware beaker. Both the rim and wall display pronounced warping, there are large shrinkage cracks in both the wall and the base, and there can be little doubt that the vessel is a discard.

The vessel bears two *prae-cocturam* graffiti, one under the base, the other on the wall. The first of these reads:

> Αβασκαντου και Επινικου
>
> of Abascantos and Epinikos

This is a signature, giving the names of two men involved in the vessel's manufacture. The other graffito, in the same hand, runs around the body in a single band. It reads:

---

36 Potter and King (1997, 30–32 and 320–325).

37 Carta geologica d'Italia, foglio 143 Bracciano, formation P[3] (*Argille sabbiose con alternanza di sabbie argillose*).

38 See Peña (1992, 115–119) for the use of clay deposits of this kind for the manufacture of cookwares in Central Italy.

39 Potter and King (1997, 356–366).

> Φιλοφιλος λεγομαι πιων νοησεις οτι ου ψευδομαι
>
> I am called a friend of friends—Drinking, you will understand that I do not deceive

At its end is the caricature of a stork depicted nesting on a rooftop.

The names of the two men in the first graffito are Greek, and it is evident that at least one was a more than marginally literate Greek-speaker, who, if he composed the text of the second graffito as well as incising it, was a culturally sophisticated person. While it cannot be excluded that his rôle in the manufacture of the vessel was limited to the executing and perhaps also the composing of the texts, it seems likely that he was involved in pottery production at the villa.

6 General Conclusions Regarding the Study of Pottery Production Facilities

The four cases considered provide some idea of the substantial variability present in the organization of pottery production in the rural Central Italy during the late Republic and the early/middle Empire, while also illustrating the nature of the archaeological evidence at our disposal for the study of the potter's craft, highlighting both its analytical possibilities and limitations.

Chiusi Marcianella and Scoppieto—two sites at which well-preserved remains were subject to controlled stratigraphic excavation—document developments in the production of high-end tablewares from the late Republic to the early Empire, with this shifting from small establishments that manufactured these wares in what must have been modest amounts along with a wide range of other products for local distribution to large establishments specialized in the manufacture of these wares at a near industrial scale for regional and even supra-regional distribution. Scandicci Vingone, a rescue excavation. produced poor quality evidence for pottery production during the early Empire. The organization of this production remains unclear, although it may have involved a single establishment engaged in variegated production or a cluster of establishments that each turned out a limited range of wares. Whatever the case, these products were likely destined for the local market. At La Mola di Monte Gelato, where all we have is a well-excavated dump of manufacturing refuse unassociated with any production facility structures, we see what appears to have been mixed production during the middle Empire that very probably occurred

in the context of a rural estate, presumably for self-supply and perhaps also supply to the local market.

Turning to the analytical possibilities and limitations associated with the archaeological evidence for pottery production, we can begin by noting that, given the costs of excavation and the vicissitudes of access and preservation, it is virtually never the case that we can determine the extent of, let along excavate the whole of a pottery production facility. That said, we probably do enjoy somewhat better opportunities to uncover enough of a facility to gain a good idea of its layout in rural rather than town contexts, as the remains of facilities in the latter areas are often covered by a modern town.

Only somewhat less challenging is the task of determining the broader context of such facilities within the settlement landscape. Was the facility isolated? Adjacent to a modest dwelling? On the grounds of a villa? Despite these problems, we can still in some cases assign a particular case to one or another mode of production: independent, villa, craftsmen's settlement, and so forth.

In instances in which we encounter good stratified deposits it is sometimes possible to achieve a fine-grained reconstruction of the suite of products manufactured at a particular production facility, and to trace diachronic stability and change in this, perhaps inferring the market or other forces that drove this. The chances of achieving this are probably better for rural rather than town contexts, as town-based potters must often have disposed of discards and production waste at a remote location.

Programs of compositional analysis can provide a firm understanding of the suite of raw materials employed at a production facility and how these were utilized by potters to endow their products with particular performance properties. In some case results confirm our a priori locational assumptions, though they sometimes yield surprises.

The recovery at a production facility of a more or less extensive set of vessels with a maker's mark that were manufactured on the premises can provide detailed insights into some aspects of the organization of operations at the facility and facilitate the study of the distribution of the items manufactured there. In many cases, however, the specific nature of the relations between multiple individuals named in the corpus of maker's marks and the relationship between these individuals and the facility remain unclear.

Finally, *prae-cocturam* graffiti, when these occur, can provide rare insights into the persons of potters, allowing us to accomplish what in less politically sensitive times my North American pre-historian colleagues were wont to term 'finding the Indian behind the artefact'.

In closing this section, it should be noted that the pottery production facilities for which we possess high-quality evidence are still too few and far between to allow us to demonstrate in any detailed and robust way geographical or chronological patterns in modes of rural pottery production.

7 Future Directions in the Study of Roman Craft Production

To conclude this chapter I would like to consider briefly future directions for the study of craft production in Roman Italy.

The extension of the comprehensive and systematic approach employed by Santoro's research group to evaluate the published evidence for craft production in Gallia Cisalpina to other areas of the peninsula would yield results of considerable interest at relatively low cost, enlarging the overall set of data at our disposal, while producing detailed information and general overviews of both town-based and rural craft production for regions of Central and South Italy, each presumably distinguished by its particular array of resources, topography, settlement system, economic structures, regional history, and suite of local histories.

So far as fieldwork goes, the main question, or so it seems to me, is deciding how to allocate the scarce human and financial resources available to us for survey and excavation. My own preference would be in the direction of the extensive and intensive excavation of well-preserved production facilities, so as to enlarge the number of establishments for which we possess high-quality data. In my view, the benefits to be had from research along these lines are abundantly clear, as with the publication of each additional project of this kind we gain important new insights into the particulars of rural craft production. Whether it is more useful to focus on pottery production facilities, production facilities for craft items other than pottery, or sites that offer the opportunity to investigate both pottery and other types of craft production, so as to position ourselves to understand better the linkages between different crafts and the rôle of craft production more generally in the economy of a particular locale, is an important question open to debate. The advancing of our knowledge of many of the crafts other than pottery production will depend in substantial measure on the conduct of excavations in those peculiar and quite rare depositional environments that offer extensive preservation of organics.

Another possible line of research involves the on-going construction of quantitative datasets for artefacts—in the main pottery—recovered on the surface and in stratified deposits at consumption sites in rural areas, with the idea that this will enhance our understanding of the consumption of craft items

and perhaps also elucidate the specific mechanisms that served for their distribution, an aspect of craft production in Roman Italy about which we know exceedingly little.[40] I am sceptical, however, that much progress will be possible on the latter count, given the complexity of ethnographically attested systems for the distribution of craft goods in analogous cases and the likelihood that arrangements of this kind were often fairly volatile, perhaps lasting for no more than the lifetime of a particular middleman, effectively placing them beyond archaeological resolution. Work of this kind will be facilitated by newly emerging or recently emerged technologies, such as hand-held x-ray fluorescence (XRF),[41] digital microscopy,[42] and web publication, as these will permit the amassing of substantially larger compositional datasets and facilitate the circulation and sharing of results.

40 See the contribution by Tol (this volume) for the mechanisms for the distribution of craft goods in Roman Italy.

41 See Shugar and Moss (2012) for applications of hand-held XRF.

42 See Peña (2013a, 512–514) for the application of digital microscopy to pottery fabric documentation and classification.

CHAPTER 9

Italic Sigillata Production and Trade in Rural Central Italy: New Data from the Project 'Excavating the Roman Peasant'

*Emanuele Vaccaro, Claudio Capelli and Mariaelena Ghisleni**

1 Podere Marzuolo and the Project 'Excavating the Roman Peasant'

This chapter focuses on the new evidence for Italic sigillata production recently identified at Podere Marzuolo in the township of Cinigiano in inland southern Tuscany, where the project 'Excavating the Roman Peasant' has been investigating a series of small and medium-sized Roman rural sites since 2009 to shed new light on peasant life, material culture and the economy.[1] In 2012, after excavating six Roman sites previously identified during extensive and systematic field walking surveys, and realizing that some were probably non-permanent rural settlements likely used by commuting peasants who lived in nearby larger villages, we decided to start investigating one potential rural central place to analyse permanent habitations and to contextualize the smaller sites better.

The choice fell on a large settlement at Podere Marzuolo, identified by field survey in 2006 and object of a small rescue excavation in 2007.[2] The site is located on a very fertile river terrace protected from flooding, near the clay-rich confluence of the Ombrone and Orcia rivers, along one major natural pathway and an ancient road which linked the coastal areas of southern Tuscany with the more inland course of the Via Aurelia and the Via Cassia. Podere Marzuolo is composed of three surface scatters separated by a modern road that cut through the site in the 1950s. According to surface evidence the site may have been at least 2.5 ha in size, although the impossibility of surveying one wooded area between the two southernmost scatters and the northern slopes of the river terrace prevented us from obtaining a more precise idea of its extension

* Section 1 was prepared by Mariaelena Ghisleni and Emanuele Vaccaro; sections 2 and 4 by Emanuele Vaccaro, and section 3 by Claudio Capelli.

1 See in particular Ghisleni et al. (2011) and Vaccaro et al. (2013). See also Bowes et al. (this volume).

2 Barbieri (2007, 465–466).

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(Fig. 9.1). The site was also chosen because, despite its large size, the absence of rich architectural features on the surface and the homogeneity of the material culture throughout the scatters suggested that it constituted some sort of large non-elite rural agglomeration rather than a villa.[3]

Excavations were preceded by magnetometric survey in 2012, covering 6000 m^2 in the northern field; geophysics were intensified between the two excavation seasons by carrying out an ARP survey (Automatic Resistivity Profiling),[4] covering one hectare in the northern field and almost 6000 m2 in the south-western field. Together the excavations carried out in 2007 and 2012–2013 explored a total of some 560 m^2, accounting for just 2.2 % of the site, all concentrated in the northern scatter and divided into five main areas (Fig. 9.2).

The combination of excavation data and geophysical and field-walking surveys revealed a large well-planned settlement, established in the early Augustan period or slightly earlier. The site experienced a major phase of destruction in the late 1st century AD, although occupation in all the main excavated areas continued into the 2nd and 3rd centuries AD. After a long period of abandonment one part of the site was reoccupied in the 12th century AD with the construction of a church.[5]

Roughly the same early Augustan initial chronology was suggested by excavations in the main areas, where a large *opus reticulatum* building was uncovered (Areas 10000 and 14000) and the presence of, respectively, a row of rectangular buildings with a backyard, and a series of kilns of uncertain function (Areas 11000 and 12000) was ascertained. The wall alignments and the few collected ceramic fragments all suggest that the small room excavated in 2007 in Area 15000 and the structures in Area 13000 were planned and constructed at the same time. All the Roman-period walls share the same NW/SE orientation, leading to the hypothesis that the whole northern sector of the site was planned and built together in the early Augustan period or slightly earlier. The large, only partially excavated, *opus reticulatum* building may have been the epicentre of this planned settlement, although its function is still uncertain due to the absence of floors (apart from one room) and occupation levels. Nevertheless, the excavated portion of the building, with its small rooms and the subdivision

3 It should also be noted that the only villa site in the territory of Cinigiano is that at Santa Marta, some 9 km south-west of Marzuolo; on the Roman to late antique villa site see Ghisleni (2009) and Campana et al. (2013).

4 The ARP survey was undertaken in collaboration with the GEOSTUDI ASTIER SRL from Livorno; the interpretation of the raw datasets was later refined using the GIS data of the project 'Excavating the Roman Peasant' in combination with other available evidence.

5 Bowes et al. (2013).

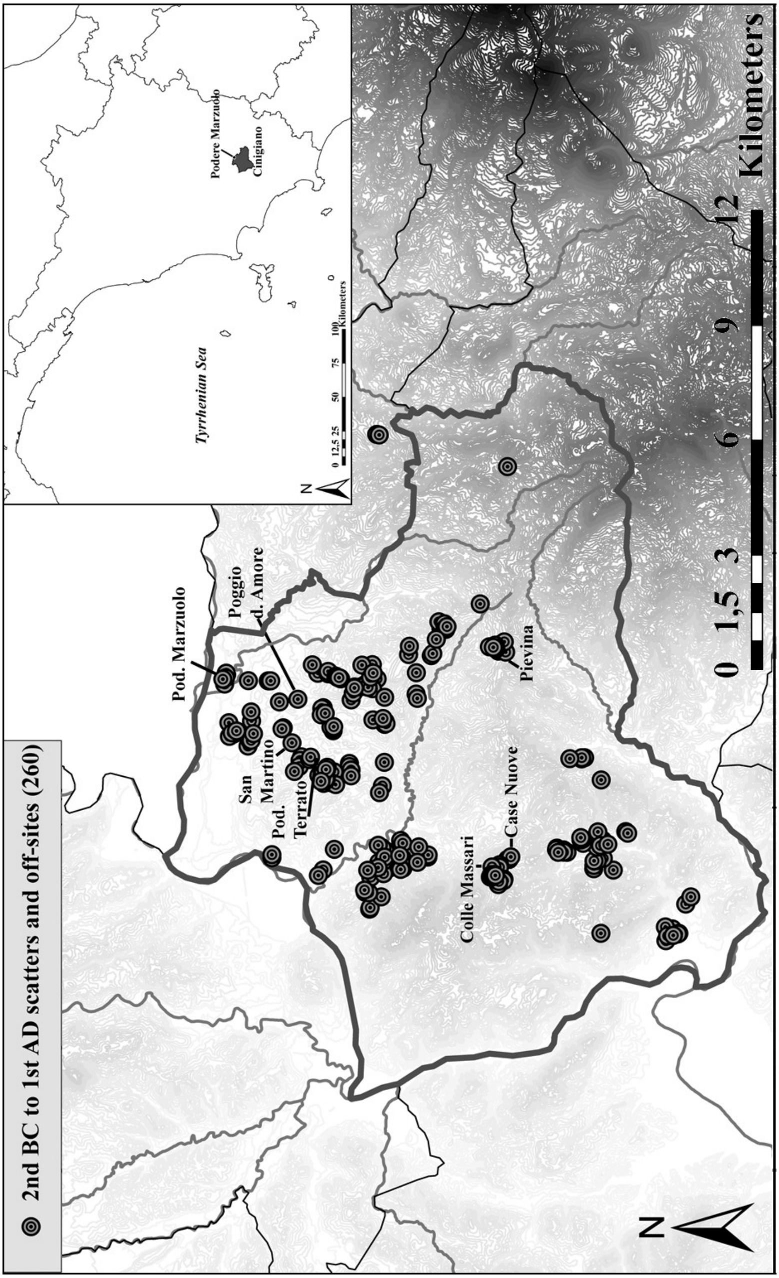

FIGURE 9.1 *Location of Podere Marzuolo in the territory of Cinigiano (southern Tuscany), the Roman sites excavated by the Excavating the Roman Peasant Project between 2009 and 2013 and surface scatters and off-sites identified in Cinigiano during systematic field surveys between 2006 and 2008 (GIS map by Emanuele Vaccaro)*

FIGURE 9.2 *Visualization of the excavated Roman evidence at Podere Marzuolo on the* ARP *(Automatic Resistivity Profiling) survey carried out on the northern and south-western surface scatters. The three scatters composing the large site at Podere Marzuolo are in white colour (*GIS *map by Emanuele Vaccaro).*

of one room by a very small wall, would appear to suggest a utilitarian rather than a domestic function. Of course, this does not rule out habitation in other, unexcavated portions of the same building.

Podere Marzuolo, since its establishment, seems to have included a production component, as documented by both Italic sigillata (to be discussed shortly) and other evidence. Field surveys recovered metal slags both in the northern and the south-western scatter. The 2007 excavation produced large quantities of iron slags, and while no kilns associated with iron working have been found, the available evidence points to iron working somewhere on the site. Furthermore, two small kilns were unearthed in the backyard of Area 11000, which were constructed shortly after each other in the early to mid-Augustan period. They were both found completely empty and their diminutive size would suggest the production of small objects, perhaps of bronze or other metals but not iron. Another kiln, again completely empty and devoid of any wasters or slags in the surrounding area, was excavated south of the rectangular building of Area 11000, attesting to the concentration of part of the production activities in this area (Fig. 9.3). The size and shape of the kiln are both not incompatible with ceramic production, although the absence of in situ production markers pre-

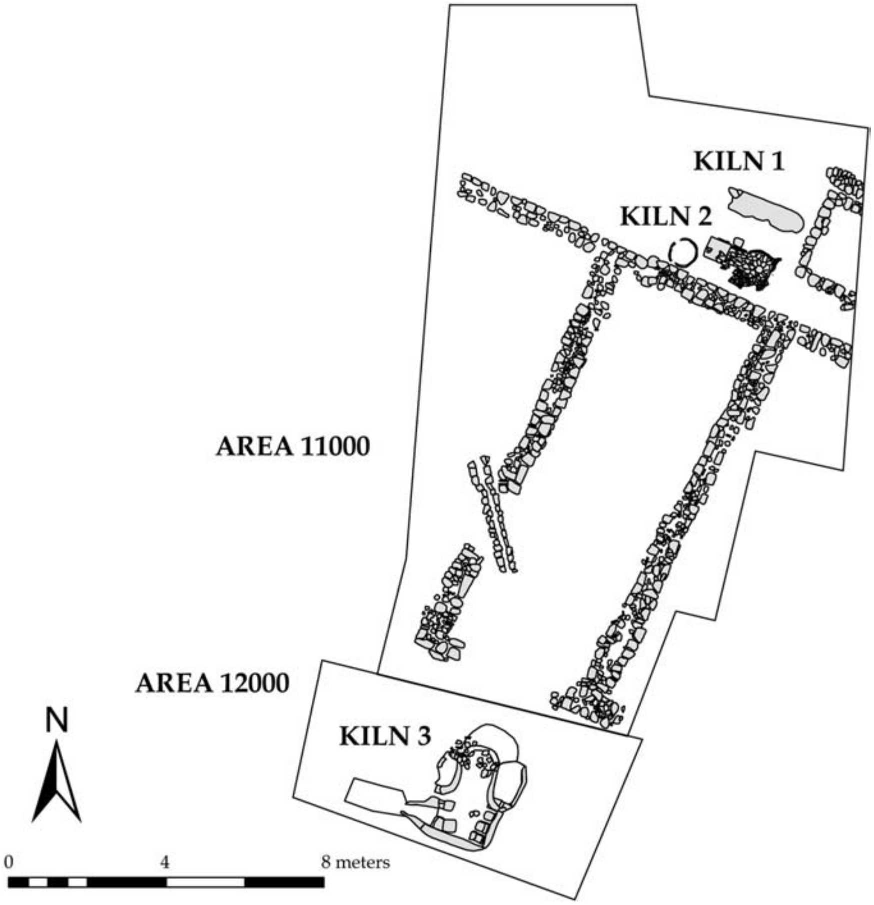

FIGURE 9.3 *Kilns of uncertain function from Areas 11000 and 12000; they were all found completely empty (GIS plan by Emanuele Vaccaro)*

vents us from proposing a definitive identification. According to the available data all production activities came to an end in the late 1st century AD, although the site continued to survive in some way and was still supplied with a number of imported commodities and engaged in monetary exchange into the 3rd century AD.

2 The Italic Sigillata at Marzuolo: New Evidence of Production?

The location of Podere Marzuolo on a river terrace, near clay sources and along one major terrestrial route was ideal for establishing a large production site,

which also may have served as a trading hub engaging in local, regional and overseas exchange (*infra*).

Before moving on to the presentation and discussion of the ceramic evidence it seems worthwhile to engage in some broader considerations, to establish the context of Italic sigillata production in central Italy, and to emphasize the importance of the new discoveries from Podere Marzuolo. Gloria Olcese's recent atlas of ceramic production sites in Tuscany, Lazio, Campania and Sicily provides an overview of the urban and rural contexts specializing in the production of Italic sigillata between the last decades of the 1st century BC and the 1st century AD.[6] Figure 9.4 shows that the highest concentration of Italic sigillata workshops was in Arezzo and in its environs, with some significant evidence in Pisa at least since c. 15 BC, the time of the establishment of the workshop of *M. VALERIVS VOLVSVS*.[7] What is interesting is the complete lack of evidence for production at coastal and sub-coastal sites south of Pisa.[8] This absence may be explained by assuming that most local demand was met by Arezzo's potters, who did not need to establish subsidiary branches distant from the main workshops.[9] If this makes sense in general, the evidence from I Poggetti near Torrita di Siena (excavated in 1986 and 1987), where a ceramic workshop specialising in the production of Italic sigillata, thin-walled pottery, coarse and kitchen wares and possibly amphorae and tiles was unearthed, offers a more complex picture.[10] The production site at Torrita, operating in the mid-1st century AD or slightly later, is a quintessential example of a branch workshop whose production probably fed local and regional rather than extra-regional demand. The production sites at Podere Marzuolo and Torrita di Siena differ from each other in settlement typology—the former is a large planned road-site, whereas I Poggetti was only a ceramic workshop possibly related to a nearby Roman villa—as well as in the fact that the production at Podere Marzuolo lasted longer and was more specialized, in that it turned out only Italic sigillata (as regards pottery manufacturing). Nonetheless, our site shows some interesting parallels with Torrita di Siena, particularly in its hypothetical second production phase. Unlike Torrita di Siena, the evidence for Italic sigillata production at Marzuolo begins in the early Augustan period.

6 Olcese (2012).

7 Menchelli (2011a, 21); Pasquinucci and Menchelli (2012, 191).

8 'Sub-coastal' here refers to a distance of 20 km from the coast.

9 On the problem of identifying the small workshops of central Italy, see for example Klynne (2006, 167–174).

10 Pucci (1992).

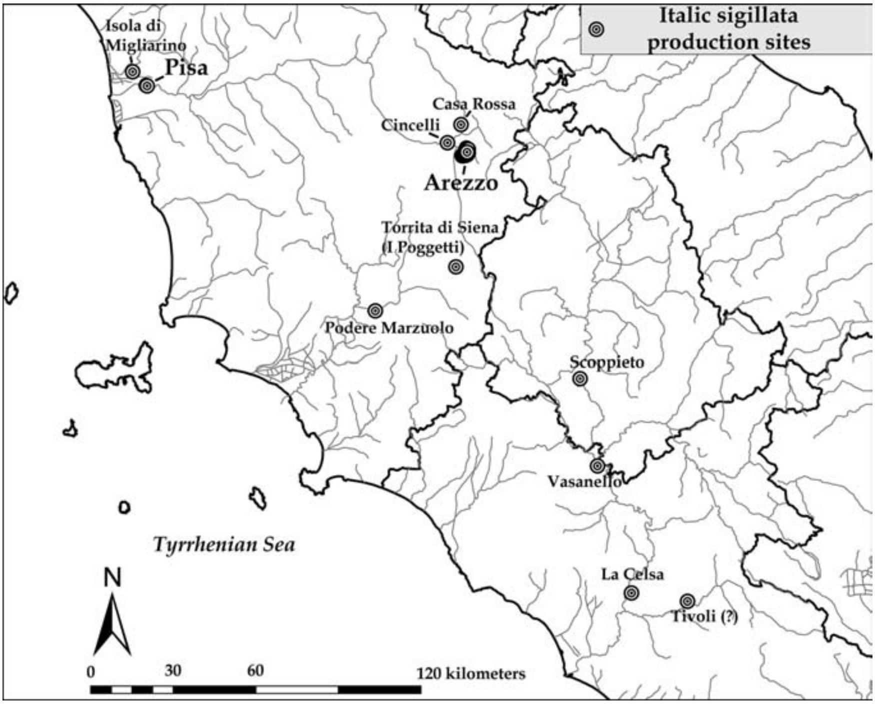

FIGURE 9.4 *Distribution of the Italic sigillata production sites so far identified in central Italy (based upon Olcese (2012)) (GIS map by Emanuele Vaccaro)*

Possibly 'Experimental' Sigillata Production at Marzuolo (c. 30/20–10 BC)

A series of six rubbish dumps yielding 3,555 potsherds (accounting for a total of at least 339 vessels) were excavated in 2012 in the backyard adjacent to the north side of a row of rectangular buildings. These assemblages, which were also very rich in animal bones (over 800 bones were recovered) and characterized by a highly mixed taphonomy, seem to constitute accumulated trash, heterogeneous in composition and deriving from different activities including domestic ones, and probably also 'experimentally' produced sigillata that was subsequently deposited in the middens,[11] all likely dating to the period 30/20–10 BC. The one exception is the earliest context excavated at the site, which possibly dates to c. 30 BC or slightly earlier and yielded none of the production markers discussed below. The dumping activities also coincided with the dismantling of the three kilns of uncertain function.

11 The zooarchaeological study was carried out by Michael MacKinnon (University of Winnipeg).

TABLE 9.1 *Quantified ceramic classes from the early to mid Augustan dumps in Area 11000 (MNI = Minimum Number of Individuals)*

Ceramic classes	MNI	%
Italic Sigillata	45	13.27
Transitional sigillata	89	26.25
Black Glaze	18	5.30
Thin Walls	21	6.19
Colour coated ware	8	2.35
Coarse ware	56	16.51
Coarse ware/Amphorae	4	1.17
Amphorae	11	3.24
Kitchenware	63	18.58
Vernice rossa interna	8	2.35
Lamps	12	3.53
Other ware (kiln spacers and tubules?)	4	1.17
TOTAL MNI	**339**	**99.91**

The heterogeneity of the assemblages is shown in the cumulative Table 9.1. Particularly worth noting is a class of fine ware here named 'experimental' sigillata, a problematic term among ceramicists, as this and similar definitions (such as 'presigillata' and 'transitional' sigillata) are often used loosely to describe a variety of productions which in some cases have little to do with Italic sigillata.[12] In this chapter the term is applied to a large number of vessels (89 out of 339 MNI) which although presenting features similar to Italic sigillata, such as the levigation of the clays, the sintered slip, similar forms and the presence of central and radial stamps on the bottom, also reveal differences. These are a high incidence of misfiring, very often observable on the same vessel (with tones varying from red to dark brown and black), the presence of non-slipped or semi-slipped vessels,[13] and a rather low degree of standardization resulting in the presence of a large number of variants of the same type as well as a few forms not conforming exactly to the main known Italic sigillata types.

12 Wells (1990, 4).

13 C. 68.5 % of the experimental sigillata vessels from Area 11000 is misfired, whereas c. 2.2 % is non-slipped.

The information provided by the radial and central stamps is particularly revealing: a total of 15 stamps were noted, only two of them associated with true Italic sigillata. They bear the names *AVRELIVS* (*A^VRE*, in plain rectangle)[14] and *VMBRICIVS* (*V^MBRI*, ligature uncertain, in plain rectangle);[15] the activities of the former date to approximately 15 BC whereas the latter, who is much better documented, operated from 10 BC to AD 50 and beyond. Of particular interest are the other stamps, which can be subdivided into two main groups, *SEX*[16] and *SEXTI* (the latter should be read as *SEXTILIVS*) on double line (missing *L* or *LI*).[17] The two groups are represented with ten and three specimens respectively; both belong to the early Augustan period. Unfortunately, the fragmentary state of the material prevents us from reconstructing the complete profile of the forms bearing this stamp; however, the base shapes suggest that they may belong to small carinated cups Conspectus-8, and to platters Conspectus-1. At least 20 vessels among the 'experimental' sigillata are of the early Conspectus-1 type, and the fabric and the misfiring patterns are both fully compatible with the large bases stamped *SEX* and *SEXTI*, suggesting that this type was part of that production. Interestingly, one Conspectus-1 platter is non-slipped, an observation confirmed by thin-section analysis; another specimen can be attributed to a non-slipped kiln waster. A total of 63 'experimental' sigillata vessels could be attributed to existing Italic sigillata types and to new variants of known forms. Together they reveal a wide range of functional shapes, including a number of large and medium-sized platters, both handled and non-handled cups, and carinated bowls. Figure 9.5 presents a selection of the documented forms and variants; clearly observable is the low degree of standardization typical of the 'experimental' sigillata at Marzuolo, which we explain as a result of on-site production. The possibly local production certainly included the Conspectus-1 type but also other platters (Conspectus-10, 11 and 12), the bowls Conspectus-3/8, and perhaps the handled cups Conspectus-30 and 38 as well, which often appear highly misfired to the same shades as the stamped bases *SEX* and *SEXTI* and which in one case is non-slipped.

Arguments in support of a hypothesis that a local production of 'experimental' sigillata took place at Marzuolo depend on a series of features shared by a group of vessels:

14 OCK (2000, no. 422).
15 OCK (2000, no. 2441).
16 OCK (2000, no. 1958).
17 OCK (2000, no. 1961).

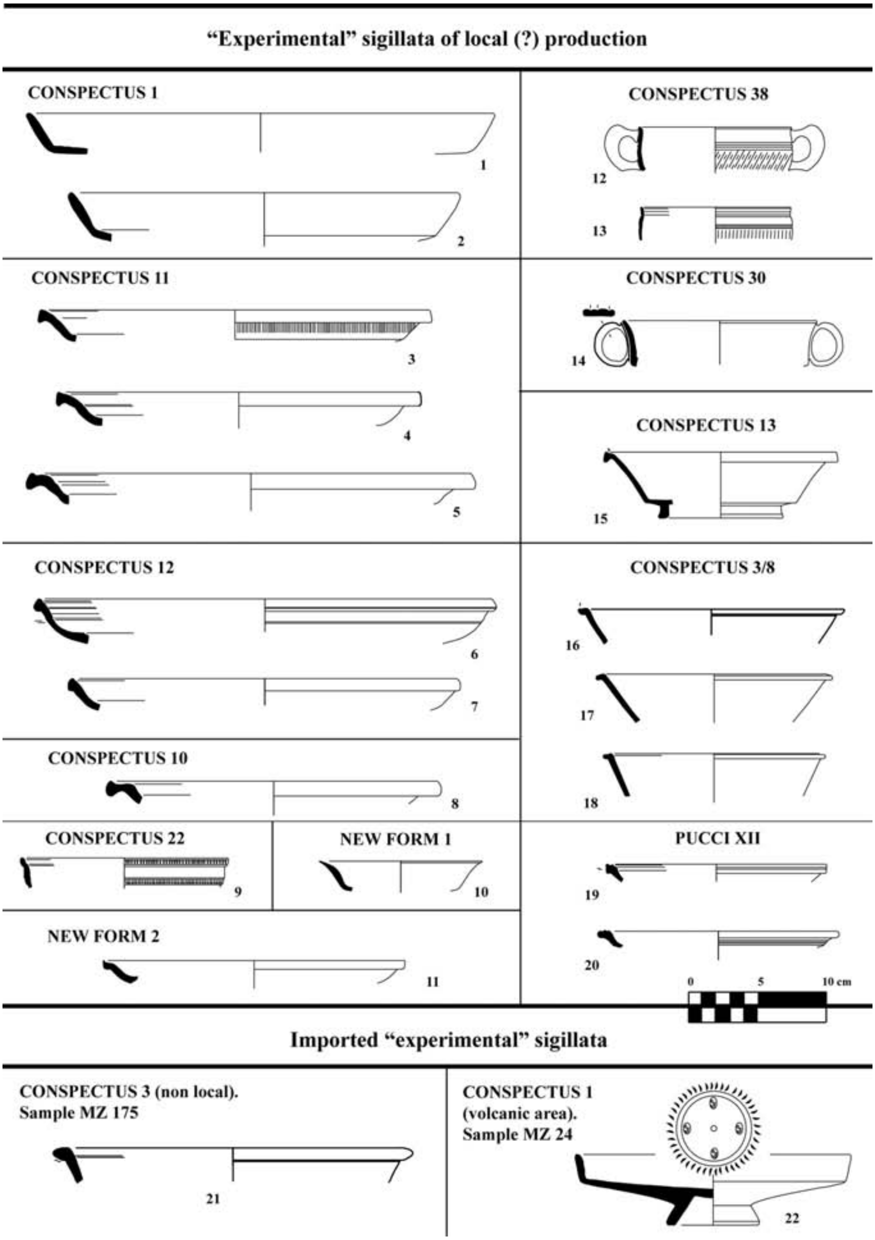

FIGURE 9.5 *Nos. 1–20: sample of 'experimental' sigillata forms of local production from Area 11000; nos. 21–22: imported 'experimental' sigillata from Area 11000 (drawings by Emanuele Vaccaro)*

- A high incidence of the stamps *SEX* and *SEXTI* (Fig. 9.6);
- A systematic association of these stamps with misfired slip, over-heated fabrics and similar, levigated clay with occasional mica and microfossils;
- The presence of a 'dotted' pattern which frequently appears both on stamped bases and on rims and carinated walls which seem to belong to the same production (Fig. 9.6).

The latter feature could be linked to the use of a rudimentary muffle used in the firing process, which failed to guarantee the homogeneous indirect-flame firing process expected in the production of red-slipped fine wares. The ceramic assemblages discussed here yielded a large number of fragments of thin (c. 0.8 cm thick) clay plates, perforated (before firing) and non-perforated; they account for 130 fragments of different sizes and weighing 1.5 kg in total (Fig. 9.7). Some had clay crusts and variable colours due to exposure to high temperatures. In their shape and size the non-perforated plates have parallels in those found at Scoppieto[18] and Vasanello;[19] they are interpreted as structural elements for the muffle used in firing Italic sigillata.[20] However, most of the clay plates at Marzuolo are perforated (see illustration), which makes it hard to believe that the local potters intended or were able to construct a proper muffle to achieve perfect indirect-flame firing and prevent flames, gasses and smoke from reaching the vessels.[21]

One possibility is that the non-perforated plates were used to construct the actual muffle whereas the perforated ones provided shelves inside it. Similarly perforated clay plates, so-called *case*, were still being used in potteries in the Early Modern period to produce glazed wares, as revealed by a 16th-century treatise by Cipriano di Michele Piccolpasso.[22] Moreover, the fabric of these clay plates is similar to that of the 'experimental' sigillata vessels stamped with *SEX* and *SEXTI*, while the distribution of the holes is very similar to that of some of the perforated clay tubules found at Lyon and used for sigillata production in the period 15 BC–10/15 AD.[23] The latter parallel may also indicate that the perforated clay plates at Marzuolo were used by local potters to construct the kiln's chimneys rather than the actual muffle, whereby the holes were intended to allow quicker firing and ventilation without—given the holes' tiny size—risking too much penetration of smoke and gas into the firing chamber.

18 Bergamini (2011, 345–346); Bergamini (2006, 283–298).
19 Cuomo di Caprio (2007, 338).
20 Cuomo di Caprio (2006, 299–300).
21 Cuomo di Caprio (2007, 339–348).
22 Conti (1976, 196–199).
23 Desbat (2006, 306, particularly Fig. 5).

FIGURE 9.6 *Nos. 1–5: stamps (SEX and SEXTI) on local; 'experimental' sigillata; no. 6: typical 'dotted' pattern on local 'experimental' sigillata (photos by Emanuele Vaccaro)*

FIGURE 9.7 *Perforated and non-perforated clay plates from the early to mid-Augustan ceramic assemblages in Area 11000 (photo by Emanuele Vaccaro)*

This rudimentary attempt to produce sigillata seems to be compatible with the location of Marzuolo in a marginal rural area, distant from Arezzo, and at an early stage of Italic sigillata production. We should not forget that Marzuolo, if local production is confirmed by further research, might be one of the very few subsidiary workshops yet documented at a distance from Arezzo in the early Augustan period. The second half of the 1st century BC in the territory of Cinigiano seems to have coincided with a significant increase in the number of rural sites compared to the emptiness of the Etruscan period, as systematic field walking has revealed. We may therefore imagine the establishment of a ceramic workshop to have met the local demand of rural communities.[24]

Italic Sigillata Production at Marzuolo (AD 50–70)

The second set of data suggestive of local production of Italic sigillata at Marzuolo comes from the 2012 excavation in Area 10000. The excavation of a large colonnaded warehouse (collapsed towards the end of the 1st century AD) produced an astounding primary deposit in a small area of about 1 m2, containing some 250 Italic sigillata vessels still in well-organized stacks. The best-preserved stacks included some with Conspectus-3 dishes, Conspectus-4 platters and two different modules of Conspectus-34 flanged cups. Precise stacking characterized a series of carinated cups of type Pucci XXIX, all of the same shape although varying in size. Even the very large Conspectus-20 and Conspectus-21 platters were piled up, although the smaller numbers resulted in less impressive stacks. The stacking criterion for chalices seems to have been less regular whereas a series of pyxides with lids were found placed one inside the other, from smaller to larger (five modules were observed) like a set of Russian dolls. The meticulous original subdivision of the vessels, their type-by-type stacking and the small area of the deposit all suggest that these represent materials that were originally stored on a shelf or in a cupboard that was smashed by the weight of the collapsing roof (Fig. 9.8). The large number of Italic sigillata present and the consistency of the forms (see below) are insufficient in themselves to support local production, but other features yielded additional evidence.

As many as 129 vessels (51.6 %) showed evidence of more or less marked misfiring, with surface colours ranging from red to dark reddish brown on the same vessel and exhibiting clear differences between one side and the other, or between inside and outside. In a number of cases the colour on the same

24 Ghisleni (2010).

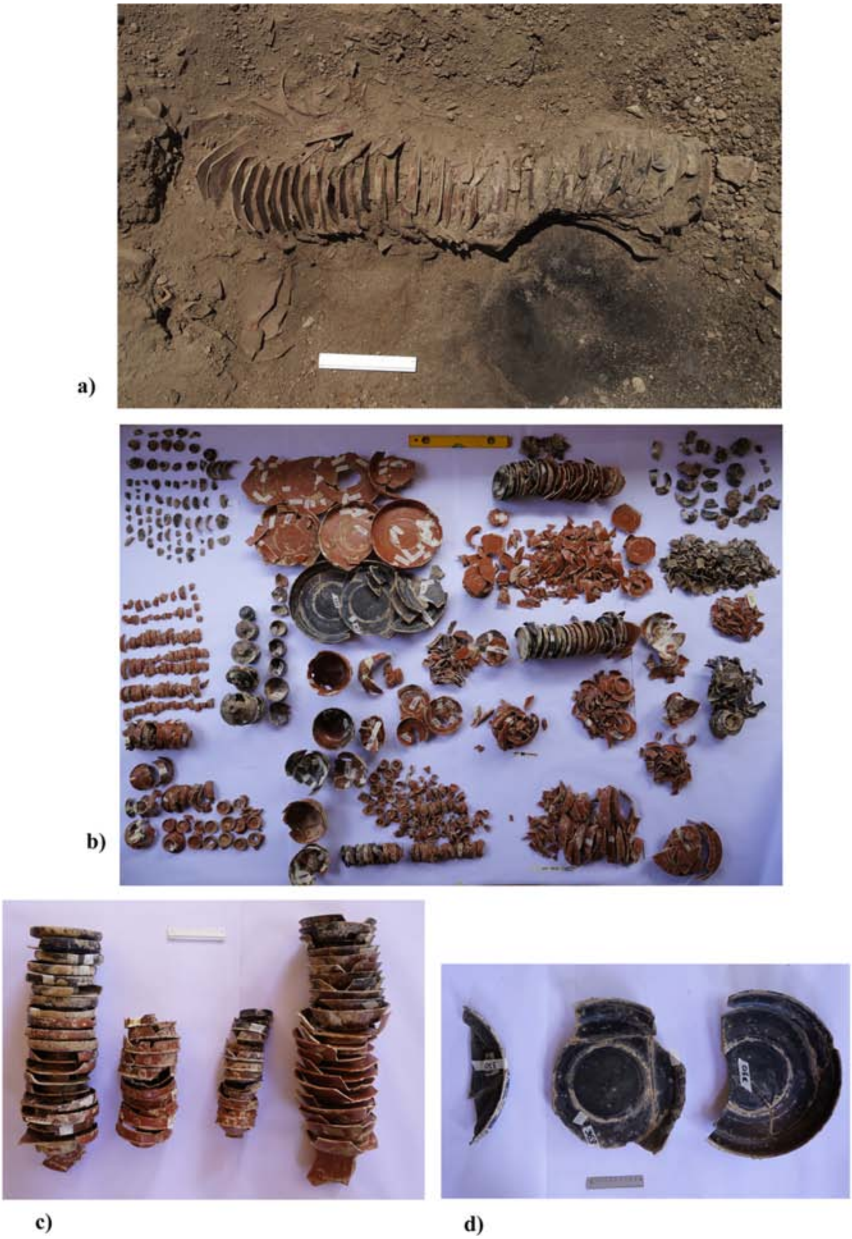

FIGURE 9.8 *a) View of the stack composed of Conspectus 3 dishes at the time of excavation; b) view of the all Italic sigillata assemblage from Context 10093; c) partially reconstructed stacks of forms (from left to right) Conspectus 4.6.1, two modules of Conspectus 34 and Conspectus 3.3 with firing defects increasing from the bottom to the top; d) overfired dishes Conspectus 20.4 and Conspectus 21.3 (photos by Paolo Nannini)*

specimen varied from dark reddish brown to black. Particularly relevant are the firing defects observable in the upper part of the vessel stacks, with proper red-slipped specimens from the bottom up to the middle section, followed upwards by progressively more misfired specimens, and the darkest colours appearing at the top of the stack. The stack of Conspectus-4 platters, composed of 43 vessels, is typical. Starting at the bottom the first 18 vessels were red, vessels 19 to 29 varied in colour from brown to dark brown, after which those up to vessel 34 changed into progressively darker tones of brown, while the topmost nine vessels were almost completely black.

Thin-section analysis applied to 15 samples from this deposit bearing different stamps revealed the same type of levigated fabric rich in mica flecks, with microfossils and rare argillites (*infra*). The slip is highly characteristic: relatively thick, well-sintered and highly levigated. Our hypothesis is that these vessels were produced at Marzuolo and stored on shelves, preserving the same stacking arrangement as had been used to load them into the kiln. The more or less misfired vessels had not been checked out but were retained either for future use at the site or to be sold at a discount (or both), as the misfiring did not affect their functionality, only their appearance. It does not seem likely that these vessels were imported from a distant production site; the closest is Torrita di Siena, 35 km away, while Arezzo is situated 68 km further inland. Moreover, if they had been transported they would have been loaded onto a cart whilst retaining the exact order in which they had been stacked in the kilns, as the progressive increase in firing defects from bottom to top clearly shows to have been the case. Furthermore, the fabrics of the materials analysed do not have any parallels among known products from Arezzo or Pisa, whereas Torrita di Siena[25] is even more unlikely as archaeological evidence has not revealed any production of chalices and pyxides[26] at that site, whilst these forms are well documented at Marzuolo.

Playing the devil's advocate, one might argue that the misfiring might have been caused by the fire that led to the warehouse's collapse. This can easily be ruled out by considering that a fire, no matter what temperature it reached, cannot have produced the progressive misfiring observed in the stacked vessels. Two other contexts, both contemporary and adjacent to the Italic sigillata one, one including a large amphora deposit and the other composed of coarse-

25 No reference material is currently available for the production site near Torrita di Siena. Nonetheless, the archaeological evidence seems to rule out import from this production site since the Italic sigillata repertoire is more diversified at Marzuolo (the hypothetical consumption site) than at Torrita (the hypothetical workshop supplying Marzuolo).

26 Pucci (1992, 100–113).

TABLE 9.2 *List of the Italic sigillata stamps documented at Podere Marzuolo and Torrita di Siena* (*MNI = Minimum Number of Individuals*)

Podere Marzuolo	**Stamp**	**MNI**
	Planta pedis *MANNE*	82
	Planta pedis *MN*	59
	Planta pedis *A.MN*	5
	Planta pedis *A.M.VR*	3
	Planta pedis *L.VM.H*	22
	Framed *T.RVFR*	1
	Total	172
Torrita di Siena	**Potter**	**MNI**
	C.VMBRICIVS CORDVS	56
	CAMVRIVS	2
	MANNEIVS	1
	L. VMBRICIVS H ( )	7
	Total	66

ware vessels, underwent the same process of destruction after a fire but do not display any similar misfiring defects.

The homogeneity of this nucleus, despite the different stamps (which are all *in planta pedis*), is further evidence in support of local production. The epigraphic evidence offered by stamps on 172 vessels helps to define the organization of the production and the artisans involved in it (Table 9.2).[27] A total of 146 vessels are stamped *MANNEIUS*, in three or four different stamps depending on the size of the vessel. Platters such as Conspectus-3.3, Conspectus-4.6.1, Conspectus-20.4 and Conspectus-21.3 are all stamped with the longer *in planta pedis* stamp *MANNE*.[28] On the other hand, smaller vessels such as Conspectus-

27 On the organization of Italic sigillata production in general, see Kenrick (2004, 253–262) and Fülle (1997, 121–144).

28 OCK (2000, no. 1099). Manneius' activity is dated to AD 30–70.

34.2 cups and the carinated cups Pucci XXIX carry an abbreviated name which may read *A^MN*[29]—rarely on the former and apparently never documented on the latter—or the far more usual *MN*.[30] In many cases the smaller stamps were almost certainly applied with much worn punches as they are often difficult to read, particularly the ligature *A^M* which was observed with certainty only on five Conspectus-34 cups (Fig. 9.9 for the forms). The stamps are poorly marked and only in a few cases are the letters clear-cut. The legibility of the stamps is also affected by post-depositional secondary carbonates.

However, in most cases *MANNEIVS* is documented only by his *nomen*. The other two individuals involved in the production of this batch are different: *A. M () URBANUS*[31] is represented by three stamps and *L. VMBRICIVS H ()*[32] by 22 stamps. The former stamped very large versions of Conspectus-21.3 and Conspectus-20.4 platters, whereas the latter is only attested on variations of the flanged cup Conspectus-34, which are larger than those produced by *MANNEIVS*. Also worth noting is one mould-decorated chalice signed by *T. RVFRENVS*[33] whose activity has so far been traced at Arezzo in the first four decades of the 1st century AD[34] (see Fig. 9.9 for the forms). Although the evidence provided by this batch alone cannot provide a complete overview of the Italic sigillata likely to have been produced at Marzuolo in the third quarter of the 1st century AD, it is helpful in addressing some preliminary questions.

Stamps referable to *MANNEIVS* represent the vast majority and suggest that he was involved in the production of most of the repertoire of this workshop. As at Torrita di Siena, even small workshops may have employed different individuals specializing in the production of different forms. The production of the largest dishes was assigned to *A. M () URBANUS*, whereas a larger version

29 OCK (2000, no. 1101, particularly variants 15 and 16).

30 The letters *MN* are always clearly legible whereas the expected ligature *M^A* before *N* (OCK 2000, no. 1099) is not visible on our specimens. This would attest to a more simplified stamp with only the consonants *MN*.

31 OCK (2000, no. 1061); his activity is dated to AD 30 and beyond.

32 OCK (2000, no. 2470), dated to AD 50 and beyond.

33 OCK (2000, no. 1730); dated between AD 1–40. This stamp is not completely legible, despite a cast made in collaboration with the Soprintendenza per i Beni Archeologici della Toscana. The letters *T. RV^F* are clearly legible whereas the following *R* is not.

34 This date may not conform to the period of AD 50–70 established for the rest of the deposit, a range which is supported by both potters' names and by forms which firmly point to a date no earlier than the mid-1st century AD. One possible explanation for the presence of *Rvfrenvs* would be a brief prolongation of his activity.

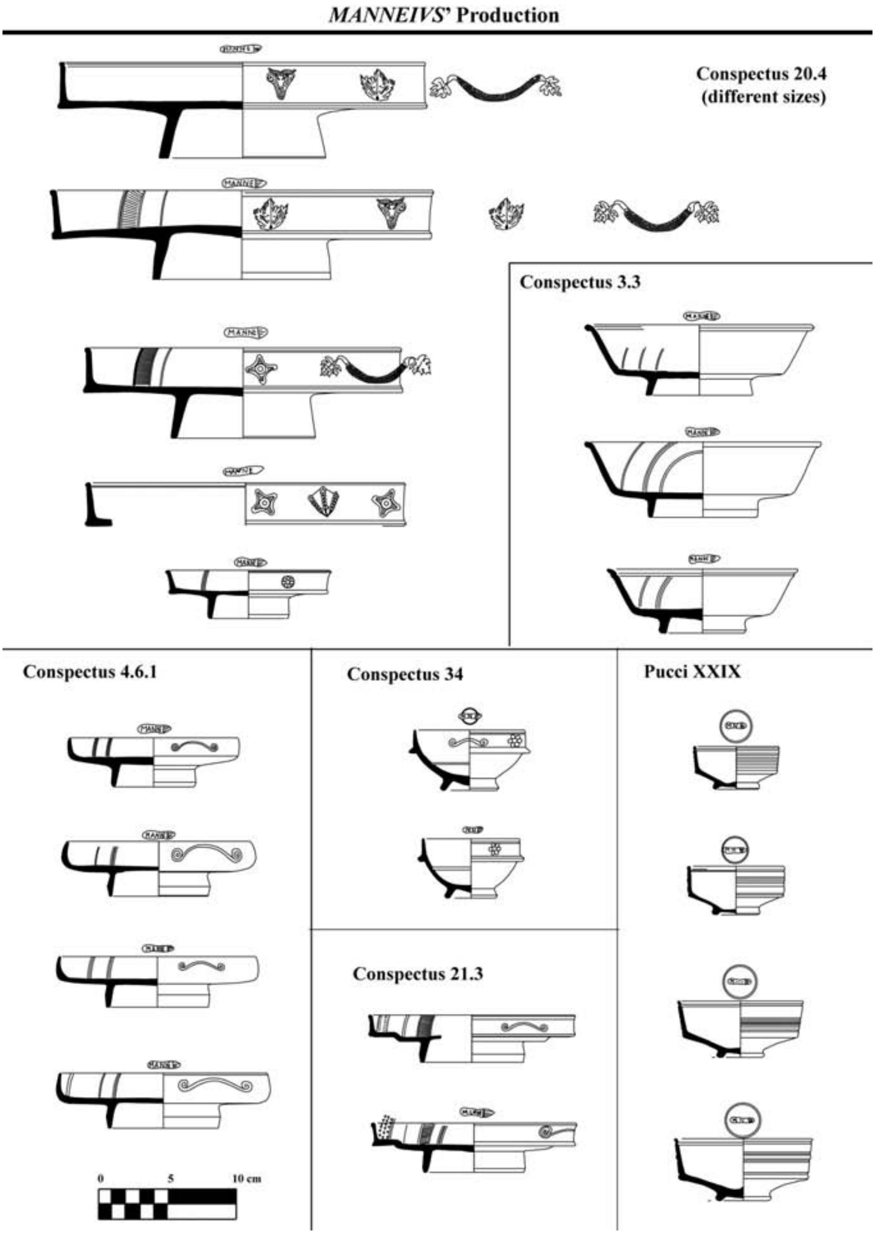

FIGURE 9.9 *Sample of Italic sigillata vessels produced at Marzuolo by* MANNEIVS (*drawings by Emanuele Vaccaro*)

of the flanged cups was entrusted to *L. VMBRICIVS H* (); with one exception, it is less clear who manufactured the chalices, which display quite a range of forms and contain different moulded decorations. Some form of collaboration between *MANNEIVS* and the *gens VMBRICIA* was observed earlier at Torrita di Siena where although local production seems to have been controlled by *VMBRICIVS CORDVS* at least one *MANNEIVS* stamp was identified among the locally produced sigillata.[35] Of particular importance is the presence—with at least seven stamps—at Torrita di Siena of the same *L. VMBRICIVS H* () who is also well documented at Marzuolo. The social structure of the workshop at Torrita di Siena was that of an enterprise run by the *VMBRICII*, mainly by *CORDVS*, whereas at Marzuolo we have the reverse situation, with *MANNEIVS* leading the operation but also relying on other potters, possibly by subcontracting to them the production of vessels not included in his local repertoire. Another, equally plausible option is that the other potters involved at Marzuolo were not themselves physically present but simply gave their stamps and other equipment to *MANNEIVS*, as a guarantee of participating in the enterprise and being paid for their products.

The likely presence of *MANNEIVS*' branch at Marzuolo in AD 50–70 sheds new light on the importance of the site for the local and possibly regional markets. After over half a century with no evidence for production (the first hypothetical phase is 30/20–10 BC) it seems that a new Italic sigillata workshop was established at the site, this time producing a range of perfectly sintered sigillata vessels, using raw materials and techniques slightly different from the experimental production and involving at least four potters. The production activities seem to have been contemporary with those at Torrita di Siena but to have involved a wider repertoire of Italic sigillata, including all the main forms documented at the time; the absence of chalices and pyxides at Torrita is noteworthy (Fig. 9.10). All the vessels manufactured at Marzuolo are characterized by a distinctive fabric and slip, which will help to track their distribution in the near future. Unfortunately our distribution study, limited to excavated and surface sites in the territory of Cinigiano, did not produce exact matches. This is not surprising, however, given the small number of both excavated and surface contexts dated exactly to the mid/second half of the 1st century AD. Most of the evidence produced by excavation and field surveys indicates a peak in rural settlement between the second half of the 1st century BC and the first decades of the 1st century AD, followed by a marked drop immediately after the mid-1st century AD. Nonetheless, it should be noted that a few Italic sigillata vessels

35 Pucci (1992, 113–116 and 143–145).

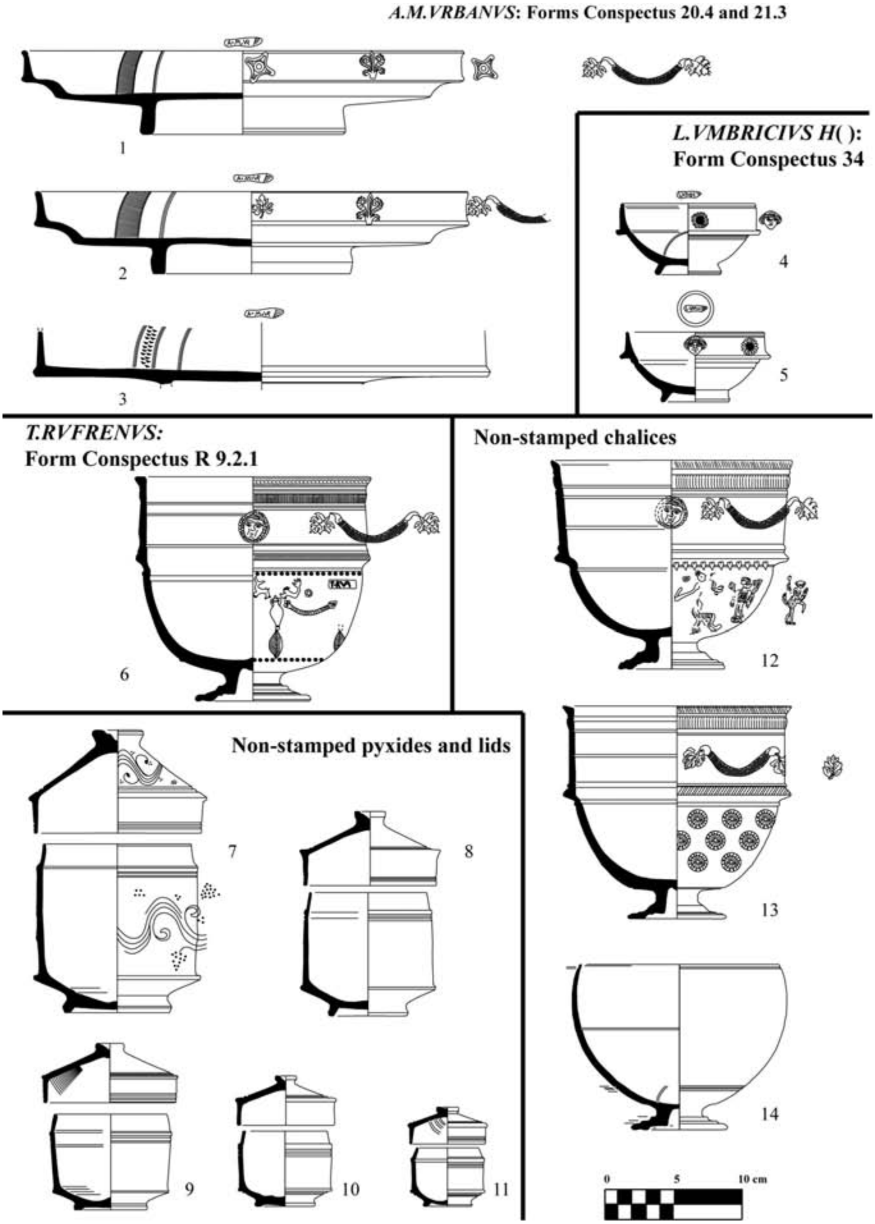

FIGURE 9.10 *Repertoire of Italic sigillata vessels referable to* A.M.VRBANVS, L.HVMBRICIVS H ( ), T.RVFRENVS *and non-stamped chalices and pyxides with their lids* (*drawings by Emanuele Vaccaro*)

from a small site at Poggio dell'Amore[36] are characterized by a fabric which macroscopically resembles that of the Italic sigillata from Marzuolo, dated to AD 50–70.

Amphora Connections

The importance of the road-side settlement at Marzuolo and its role as both a production and an inland redistribution hub is further confirmed by the identification during the 2012 excavation season of a number of large ceramic deposits. Two of these, almost exclusively composed of amphorae and storage jars, together yielded a total of 988 potsherds. Despite the large number of fragments the minimum number of vessels is quite low, 29 specimens, including some that could be partially or almost completely reconstructed. These two deposits, and others that are still being studied, point at the storage of amphorae and large containers in a specific place in the warehouse area at the same time as the sigillata deposit, which was dated to AD 50–70. They tell an interesting story of the regional and overseas connections of Marzuolo. Amphorae are represented by 24 vessels out of the 29, and they derive from three or four main sources (Fig. 9.11). A new class of sub-regional or local flat-based wine amphora is attested by a total of 14 vessels which likely fall into two main modules: a larger one, between 55 and 60 cm high, and a smaller one. Other published sites in Tuscany and central Italy have not produced specific parallels to this amphora type, but its shape and size can be generically traced back to the production of early Imperial small amphorae with a flat base, the manufacture of which in central Italy is exemplified by the Spello, Sant'Arcangelo and Forlimpopoli types.[37]

Also worth noting is the significant presence of wine amphorae from the Aegean area and Asia Minor, such as the Camulodunum 184[38] and Dressel 5[39] types, with three and six specimens respectively. Finally, one Baetican fish sauce amphora was identified. It is difficult to say if wine and fish sauce were intended for on-site consumption or if in fact the amphorae were stored at Marzuolo for future redistribution. The lack of contemporary amphora assemblages excavated at other sites in the area prevents a comparison of the amphora profile at Marzuolo with that at other rural settlements. It seems clear, however, that the number of large overseas amphorae which reached Marzuolo

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36 The small Roman site at Poggio dell'Amore, only 2 km south of Podere Marzuolo as the crow flies, is dated to the first half of the 1st century AD and possibly slightly later.

37 On these types see Bertoldi (2012, 106 and 112–113).

38 Bertoldi (2012, 133).

39 Bertoldi (2012, 139).

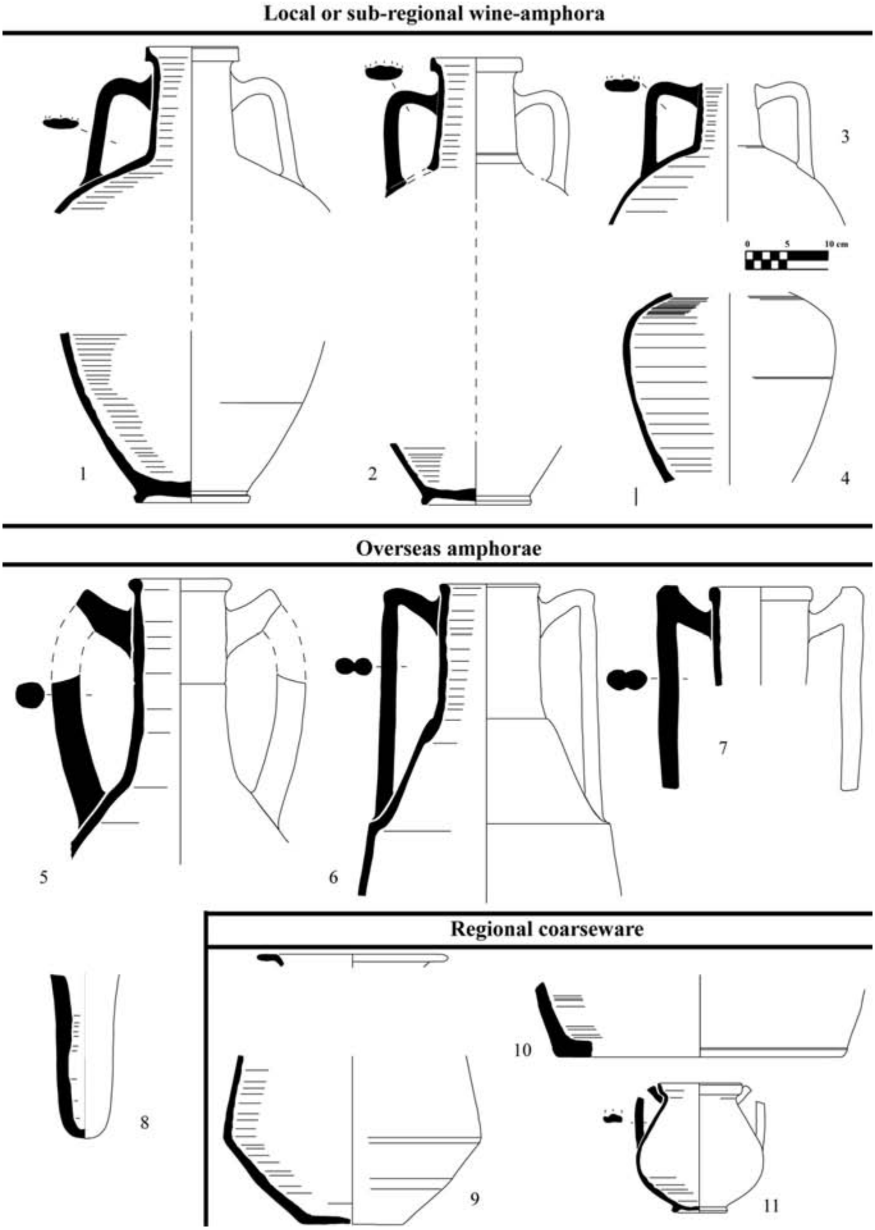

FIGURE 9.11 *Amphorae and coarse ware from two excavated contexts near the Italic sigillata deposit. Nos. 1–4: Local or sub-regional wine-amphora type; n. 5: Camulodunum 184* (*Aegean area*)*; nos. 6–7: Dressel 5* (*Aegean area or* Asia Minor)*; n. 8: Baetican amphora for fish-sauce; nos. 9–11: regional coarseware* (*drawings by Emanuele Vaccaro*).

in the second half of the 1st century AD supports the hypothesis of the centrality of the site in the context of sub-regional exchange. These amphorae must have travelled from the nearest sea-port at least c. 30 km inland to reach Marzuolo. More work on early Imperial ceramic assemblages from the urban site of Roselle is needed to determine if the town served as a redistribution hub for inland territories, as we already saw for the late antique period.[40]

3 Archaeometric Analyses

Preliminary thin-section analyses were carried out on c. 60 representative samples of 'experimental sigillata' from Area 11000, and on Italic sigillata from Context 10093, from the two Roman surface sites, from excavations carried out by the project 'Excavating the Roman Peasant' in the territory of Cinigiano; and finally also on one sample of perforated clay plate from Area 11000 and on two local clay samples.[41]

The results of the preliminary archaeometric investigations will be summarized below. Further analyses of both ceramics and local raw materials by means of more advanced techniques (such as XRD, XRF, and SEM-EDS) will be necessary to obtain more detailed data on production and technology.

Podere Marzuolo: 'Experimental' Sigillata from Area 11000 (c. 30/20–10 BC)

The analysed assemblage displays much variation in firing conditions (firing temperature and oxidizing conditions), which may be the main factor responsible for the differences observable macroscopically, especially those in colour. With that one exception, however, under a polarizing microscope the majority of the investigated samples did not reveal pronounced differences in petrographic composition and body texture.

40 On the role of Roselle as a possible redistribution centre for extra-regional commodities to the interior of southern Tuscany in Late Antiquity, see Ghisleni et al. (2011, 112–120).

41 The clay samples, which were analyzed after having been fired at 500°C, are representative of the two main types of good-quality raw materials available in the area. They were collected in the alluvial deposits in the modern bed of the Orcia river near Podere Marzuolo as well as in an exposed outcrop of Pliocene clays (Carta Geologica d'Italia 1969, foglio 128, Grosseto) c. 2.5 km east of the site. Unfortunately the clay outcrops immediately adjacent to the excavated site, on the slope towards the river, were covered by vegetation.

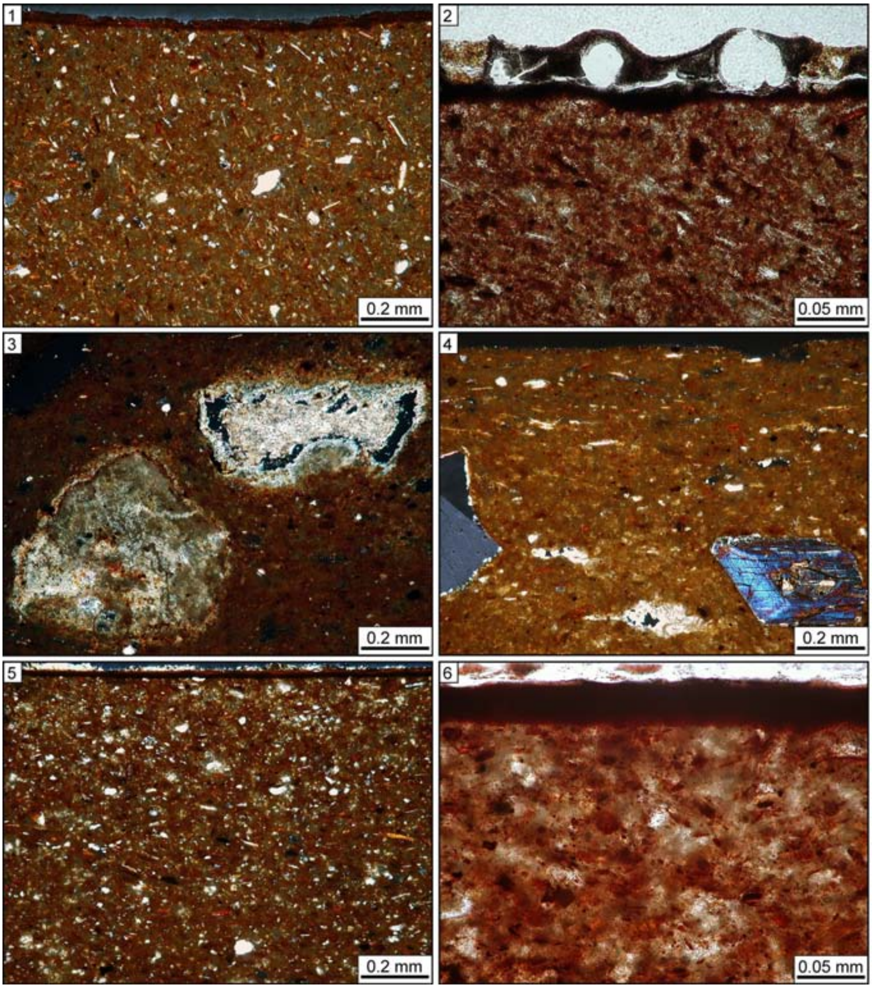

FIGURE 9.12 *Microphotographs of representative samples (1, 3, 4, 5: crossed polars; 2, 6: plane polarized light). 1: MZ15, Area 11000 (main 'experimental sigillata' group); 2: MZ14, Area 11000 (low-quality bubble-rich slip); 3: MZ175, Area 11000 (large limestone inclusions); 4: MZ24 (left: sanidine, right: clinopyroxene); 5: MZ318, context 10093 (main fabric); 6: MZ323, context 10093 (good-quality slip) (images by Claudio Capelli).*

Most of the studied samples appeared to belong to the same fabric group, although a few sub-categories could be distinguished when secondary textural and compositional variations of the bodies were taken into account (Fig. 9.12, no. 1).

The clay matrix is characterized by two components, a dominant one that is Fe-rich and a subordinate calcareous one. The aplastic inclusions are rela-

tively abundant and fine to very fine-grained (<0.2 mm, mostly <0.1 mm across). They are essentially composed of mica (biotite and muscovite), quartz, (metamorphic) feldspars, dissociated calcareous microfossils (undetermined foraminifera), rare shale and (dissociated) limestone clasts, Fe-oxide aggregates, occasional quartzite and larger sandstone fragments as well as plastic bands poorly mixed with the Fe-rich clay. The latter elements are lighter in colour and richer in inclusions than the rest of the fabric. In one sample of that group a very large fossil (2.5 mm in size) and a radiolarian chert fragment (0.5 mm) were also observed, probably the result of somewhat careless levigation of the raw clay.

Voids are rare to (more often) fairly frequent. Some of them are regular, rounded to oval in shape and can clearly be attributed to the fossiliferous component, but irregular and sometimes relatively large voids are also present. A few irregular, generally elongated voids enclosing undetermined remains may indicate primary vegetal inclusions.

The apparent firing temperatures vary from moderately high to very high (two samples were clearly over-fired). In most cases calcareous inclusions have become completely dissociated, which points to temperatures in excess of 900°C. A few of the non-overfired samples were poorly or unevenly oxidized.

The slip is red to (more frequently) brownish, and always darker than the body. It is Fe-rich, very pure, homogeneous, partly or completely sintered and generally very thin (<10 micron, rarely >20 micron). On only one sample the slip was quite thick (20–60 micron) and locally bubbled (Fig. 9.12, no. 2). Interestingly, the body of that same sample contained several fractures, possibly primary as suggested by the accretion of secondary carbonates on the edges. In a few samples no slip was present, or at least not detectable under the microscope.

The clay plate (muffle or chimney?) sample was poorly oxidized and revealed a fabric similar to that of the main group of sigillata described above. It was distinguished by the presence of a few large (<0.8 mm) inclusions consisting of limestone and shale fragments and Fe-oxide aggregates.

The fabrics of two samples of 'experimental' sigillata differ from the main group and from each other. The first sample (large bowl Conspectus-3/8, Fig. 9.12, no. 3) is characterized by a clay matrix with a larger carbonate component than the main group, as well as numerous, very coarse inclusions (up to 1 mm across) mainly consisting of poorly dissociated limestone fragments. In the fine fraction micas are relatively scarce whereas Fe-oxide aggregates and shale fragments are rather abundant. The slip (20–30 microns thick) is sintered and a brilliant red in colour when observed with crossed polars. Finally, the last sample (form Conspectus-1 with *pelta* decoration, Fig. 9.12, no. 4) is dis-

tinguished by a clay matrix rich in Ca and subordinately rich in Fe, and above all by the presence of a few volcanic inclusions, consisting of clinopyroxene, sanidine, biotite, opaque minerals, and basalt fragments (<0.6 mm). In the fine fraction quartz, mica, shales and microfossils are frequent.

Podere Marzuolo, Context 10093 (AD 50–70 Italic Sigillata)

Unlike the materials from Area 11000, the samples from Context 10093 constitute a more homogeneous group both technically and in terms of petrographic composition (Fig. 9.12, no. 5).

The bodies are formed by a clay matrix rich in Fe and subordinately Ca, and also containing abundant, fine-grained inclusions (mostly <0.2 mm, the majority <0.1 mm) frequently of mica (biotite and muscovite), subordinate quartz and feldspar, dissociated microfossils (probably foraminifera), and relatively few to moderately abundant shale fragments. Fe-oxides and limestone fragments are rare, but sometimes larger (up to 0.6 mm in size) than the other inclusions. Vegetal remains are also occasionally observed. Voids are moderately abundant to relatively scarce.

The apparent firing temperatures are medium to moderately high. The carbonate inclusions are generally dissociated whereas the phyllosilicate components (micas, shales, clay matrix) are poorly or partly vitrified. Secondary carbonates are thinly scattered throughout most samples, which should be taken into account in the case of bulk chemical analyses.

The Fe-rich slip is pure, homogeneous and relatively thick (20–40 micron). In general it is completely sintered and a brilliant red-orange or red-brown in colour when observed with crossed polars (Fig. 9.12, no. 6). In a few samples it is locally black.

In some cases the thin-section samples were taken so as to coincide with relief decorations. The presence at their base of a thin Fe-rich clayey layer similar to the slip demonstrates that the *applique* method was used for these decorations.

Although in general the fabrics of the samples from Context 10093 and those of the main group from Area 11000 share features such as a fine-grained texture as well as the generic composition of the inclusions, the two assemblages are not completely similar. Besides evident differences in technique, firing conditions and degree of homogeneity as well as in the characteristics of the slips, the body fabrics of Contex-10093 samples can be distinguished from the main group of Area 11000 by a higher frequency of mica and shale inclusions and by lower percentages of microfossils, and possibly by a slightly more abundant carbonate component in the clay matrix.

Cinigiano Area, Surveys

Although the results are preliminary, the thin-section analysis of Italic sigillata samples from both surveyed and excavated Roman rural sites in the territory of Cinigiano revealed several groups of fabrics to be related to different workshops and more or less distant production/ geological areas. Some of these groups are clearly local/regional or extra-regional imports.

One homogeneous group, clearly associated with a single workshop, is characterized by the presence of volcanic inclusions attributable to the Tyrrhenian K-alkaline effusive complexes. However, the fabric is not identical to that of the outlier sample discovered in Area 11000 (form Conspectus-1 with *pelta* decoration), which may point to different workshops.

Other samples, more variable in fabric features, show occasional inclusions of possibly serpentinite. If it is indeed serpentinite, the source area(s) should be located in an ophiolitic region, possibly in the Livornese area.

The remaining groups did not present discriminant inclusions in association with other generic components, such as mica, quartz, feldspar, and shales. They could be generically attributed to different, probably Tuscan workshops. However, a number of them are similar to some samples recovered in the excavation at Podere Marzuolo, especially to a few sub-groups of the main group of the 'experimental' sigillata from Area 11000, which we tentatively attributed to local production. It is also worth noting that the studied samples produced no positive evidence for products from the mentioned Pisa workshops.[42] Also the Arezzo production seems seldom to have reached the local area.

The Clay Samples

Neither clay sample matches any of the studied sigillata fabrics. The alluvial clay is Fe-rich and particularly pure. By contrast, the Pliocene sediment is Ca-rich and rich in coarse (up to 1 mm) shale, limestone and, subordinately, quartz inclusions; mica is rare and no fossils are evident.

Discussion of the Archaeometric Data

Despite the absence of a match with the analysed clay samples,[43] several points seem to support the hypothesis—to be confirmed by further research—of a local production of 'experimental' sigillata at Podere Marzuolo (Area 11000). The main points are:

42 Menchelli et al. (2001, 89–105).

43 However, it should be noted that only two clay samples were analysed; at present no sample is available from the Pliocene layers in the immediate surroundings of Podere Marzuolo.

– The rarity of homogeneity in firing conditions, and consequently a variability in macroscopic colour of both bodies and slips, resulting in brownish or blackish hues;
– The possible presence of wasters and kiln furniture (the muffle/chimney walls);
– The presence of a few low-quality vessels with poorly-refined bodies and, possibly, of other specimens without a slip; and finally:
– Although the fabrics of the main group are quite generic and lack highly distinctive inclusions, they do not exactly match any reference materials from the main Italic sigillata workshops in central and northern Tuscany, such as Arezzo and in particular Pisa.[44]

One point seems to contradict the above-mentioned hypothesis: the presence of at least one vessel with a fabric characterized by rather coarse-grained effusive inclusions. That petrographic component must be attributed to the K-alkaline volcanic rocks outcropping in the Tyrrhenian area from Campania to Southern Tuscany, which have not been recorded in the surrounding area of Podere Marzuolo. That sample should therefore be regarded as an imported product, probably from a southern workshop. However, this specific variant of the Conspectus-1 dish had already been singled out from the main group of 'experimental' sigillata on typological grounds, being the only one with an anepigraphic *pelta* stamp on the bottom.

Compared to the materials from Area 11000 the assemblage from Context 10093 is more homogeneous and generally of higher quality. Also in view of the homogeneous nature of the slips it seems likely that all the analysed vessels from 10093 were produced in a single workshop. The archaeometric analyses undertaken so far cannot unequivocally confirm a local production as hypothesized on the basis of the archaeological investigations. It should also be noted that (a) the assemblage is composed of rather high-quality, finished products, fairly homogeneous in composition and technique, and there is no evidence of kiln wasters or misfired shards; and (b) the body fabric is different from the fabric(s) of the main group from Area 11000 (the slips are different as well). Even so, the generic fabric composition of the pottery does not rule out a local production, and there are no striking similarities with reference materials that were at our disposal from other workshops (such as Pisa and Arezzo). If both productions were located at the same site, the chronological gap between them could explain the dissimilarities in technique, texture and composition.

44 Menchelli et al. (2001, 89–105).

4 Conclusions

Although more extensive excavations at Marzuolo are needed as well as analysis of more samples of pottery and local raw materials, using additional archaeometric techniques such as XRF and XRD, the data presented here offers new and completely unexpected evidence for the production cycle of Italic sigillata and for its experimental phase.

On the basis of the fabrics and slip a large proportion, but not all, of the 'experimental' sigillata at Marzuolo may be of local origin. This material likely accounts for 77.5% (69 out of 89) of the MNI. Other 'experimental' sigillata may not be of local origin; for example, one Conspectus-1 plate with poorly preserved thin slip of a dark brown colour and radial anepigraphic, *pelta*-shaped decorative stamps was imported from a volcanic area in southern coastal Tuscany, or more likely Lazio/Campania since the fabric in thin-section revealed inclusions of sanidine, clinopyroxene and basalt.

The minero-petrographic analysis of a total of 11 'experimental' sigillata vessels from Marzuolo revealed a medium-high texture with a small number of visible inclusions such as mica flecks and microfossils; sometimes voids produced by the decay of microfossils were observed as well. This fabric is different from those typical of Arretine products. The slip, though thin, misfired and badly preserved in hand specimens, is sintered in thin-section.

Our ongoing distribution study has come up with some interesting surprises. At least two excavated sites, Pievina and Case Nuove,[45] yielded fragments (3 from Case Nuove and 1 from Pievina) of 'experimental' sigillata with fabrics that are compatible with a volcanic source, and which appears to be similar to that of the Conspectus-1 vessel with *pelta* decoration at Marzuolo, which has an established origin between the southernmost part of coastal Tuscany and Lazio/Campania. Two more 'experimental' sigillata vessels from Pievina have a generic Tuscan origin while one possibly originates in the Livorno area (based on the presence of probable serpentinite inclusions). None of the fabrics of the six 'experimental' sigillata vessels from other excavated sites match those of the specimens likely to have been manufactured at Podere Marzuolo. Interestingly, however, the fabric of one cup base of true Italic sigillata from Marzuolo with a central *SOC* (possibly *SOCRATES*) stamp,[46] from an Augustan-

45 On the excavations at Pievina and Case Nuove see respectively Ghisleni et al. (2011) and Vaccaro et al. (2013).

46 OCK (2000, no. 1974), dated to AD 1–30.

period context excavated by the Soprintendenza in 2007, was similar to that of the group stamped *SEX* and *SEXTI*. This may indicate the presence of at least one other potter active at our site in the early decades of the 1st century AD.

Even more intriguing is the identification of at least five Italic sigillata vessels, sampled from Julio-Claudian contexts at the excavated sites Case Nuove (1 vessel) and Pievina (2) and from two surface sites in the territory, with fabrics that match those of the group of 'experimental' sigillata produced at Podere Marzuolo. These data may indicate either that the workshop at Marzuolo also produced Italic sigillata, or that another sigillata workshop nearby accessed the same clay sources.

All these new discoveries are particularly interesting as they come from a territory which was marginal in the Etruscan period but apparently experienced a short period of remarkable intensification of rural settlement from the second half of the 1st century BC and into the first decades of the 1st century AD. Fine-ware production was seemingly one of the site's main specialisms since its (early Augustan?) foundation. The production ceased when the large warehouse adjacent to the *opus reticulatum* building collapsed after a fire, although occupation continued throughout the site's existence.

Archaeometric analysis is starting to map the distribution of local products, although the second half of the 1st century AD is still missing at most of sites excavated by the RPP. Further research will have to adopt a broader perspective and look at other consumption sites in the interior and on the coast of southern Tuscany in order to reconstruct the system of exchange of Marzuolo's 'experimental' and Italic sigillata. The current body of data seems to indicate a connection between the establishment, from the last few decades of the 1st century BC onwards (as revealed by our excavations), of a large number of small and medium-sized sites in this territory and the adjacent coastal areas, and the establishment of fine-ware production at Podere Marzuolo.

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CHAPTER 10

Crafts and Trade in Minor Settlements in North and Central Italy: Reflections on an Ongoing Research Project

Sara Santoro †

1 Towards an Archaeology of Minor Settlements in Italy

This chapter will focus on the economic aspects of minor settlements, their craft production, and commerce in two Italian regions on the Adriatic coast, today named Abruzzo and Friuli (Fig. 10.1). Our first purpose is to investigate whether or not minor settlements in these two areas in northern and central Italy at large played a pivotal role in the production and distribution of goods and services on a local, regional and supra-regional scale.[1]

Secondly, a long tradition of research, from Furtwängler to Ward Perkins and Mansuelli, saw Cisalpine Gaul as a laboratory for Romanization, and as a model-population system, which the Romans were later to repeat in the Transalpine provinces. Therefore, a second aim of this chapter is to evaluate this hypothesis, i.e. if the territorial and economic organization, characteristic of central and northern Italy (in which minor settlements played a major role), became in fact a model for Roman Europe.[2] Typological classification and definition of 'compact, non-urban agglomerations'[3] during the Roman period

1 Central-European researchers have assigned this role to minor settlements: Petit and Mangin (1994a); Polfer and Mangin (1999); Tarpin (2002); Polfer (2005); Coquet et al. (2011); Cribellier and Ferdière (2012).

2 On urban and architectural patterns, see Ward Perkins (1970); Mansuelli (1982); Chevallier (1980). On provincial art, see Torelli (1998); Sena Chiesa (2008).

3 Capogrossi Colognesi (2002, 110) used this description to define *vici*. Notwithstanding demographic or socioeconomic considerations, it could also be applied to settlements that lacked administrative autonomy and were not residences of the ruling class, although they possessed 'nucleated characteristics' and the 'recognizable physical delimitation' characteristic of cities (Arthur (2004, 103–133); Zanini (2009, 111)). *Vicus* is often translated as 'village', however, which is more appropriate for the medieval phase (Carriè (2012, 39–42)). For a synthesis of the terminology used in European studies (small town, *agglomération secondaire*, *petit ville*, *kleine stad*, *kleine siedlungen*, agrotown) see Brulet (forthcoming). The settlement hierarchy is essentially based on Isidore of Seville's definition: "*vici et castella et pagi hi sunt qui nulla dignitate civi-*

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are quite complex matters and indeed still the subject of a lively debate among experts. Leaving this debate alone for now, we will follow studies by Italian scholars in using the shorter term 'minor settlement', although we are well aware of the presumed hierarchy implied semantically by the adjective 'minor'.

Vici, the best-defined category of minor settlements based on lexicography and epigraphy, *fora* and *conciliabula* all often exhibit almost urban dimensions, characteristics and components.[4] Therefore, some of the settlements to be examined here enjoyed an urban aspect and possessed a municipal statute, at least during some phases of their long history.[5] Studying them requires a diachronic perspective to account for the fact that the status and territorial hierarchy of minor settlements changed through time.

Systematic inventories of minor settlements in Gaul, realized over the past thirty years, have emphasized the importance of the *vicus* in the production and distribution of goods in rural areas. Moreover, the *vici* formed an efficient economic network linked together by the road system and serving to supply the troops on the *limes* as well as the large urban *Civitatis* capitals. The circulation of artefacts attests to this economic function. The productive and commercial organization of minor settlements materialized along the main streets, as illustrated by the characteristic building form, 'strip buildings' or *Streifenhäuse*.[6] These long and adjoining houses, lengthwise aligned to the road, had porches attached to the front, which unified the facades and at the same time functioned as artisanal and commercial space.[7] This enabled the artisans-merchants who resided in these houses to live, produce and sell their

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tatis ornantur, sed vulgari hominum conventu incoluntur, et propter parvitatem sui maioribus civitatibus adtribuuntur" (Isid., *Etym.* 15.2.11). Tol et al. (2014, 110–113) propose the expression 'minor centres', which implicitly acknowledges their central position in an area of undefined size. In some cases settlement nucleation may simply be an alternative to dispersed settlement. In any case, as the authors emphasized, the variability in minor settlements is highly relevant.

4 The debate on the legal status of the "vicus" is summarized by Todisco (2006). As Tarpin (2002) showed, the use of these terms in juridical sources, especially *forum*, *vicus* and *conciliabulum* follows a chronological development corresponding to the transformation of the minor settlements main functions.

5 Examples in Abruzzo of *vici* that became *municipia* include Superaequum, Marruvium (AQ), Iuvanum (CH), Amiternum (AQ) and in Cisalpine Gaul Fidentia (with fluctuations). Examples of fora and conciliabula in the Abruzzo that became municipia include Interamna Pretuttiorum; in Emilia, they include Forum Lepidi, Forum Popilii, and Forum Livii.

6 For a definition of this building system, see Jansen (1999, 813–819); Petit and Mangin (2002).

7 The archaeological data are ambiguous. It is not clear whether they were merely market places or whether they also hosted certain forms of production, services and trade.

FIGURE 10.1 *The two Adriatic regions, Abruzzo and Friuli, compared*

goods under the same roof as in some famous *vici* in Gallia Belgica and Germania such as Bliesbruck, Schwarzenacker, Mâlain, Vitudurum, Alesia, and Lopodunum (see Fig. 10.2).

These agglomerations covered an area of 10 to 20 ha, encompassing several quarters, each with its own character: artisanal-commercial, agricultural and/or religious.[8] Public buildings such as *thermae*, fora, theatres, temples,

8 E.g. Bliesbruck, which comprised a *vicus* (residential and production centre), a large villa with an axial plan (Reinheim), and two outer sanctuaries; see Petit et al. (2013).

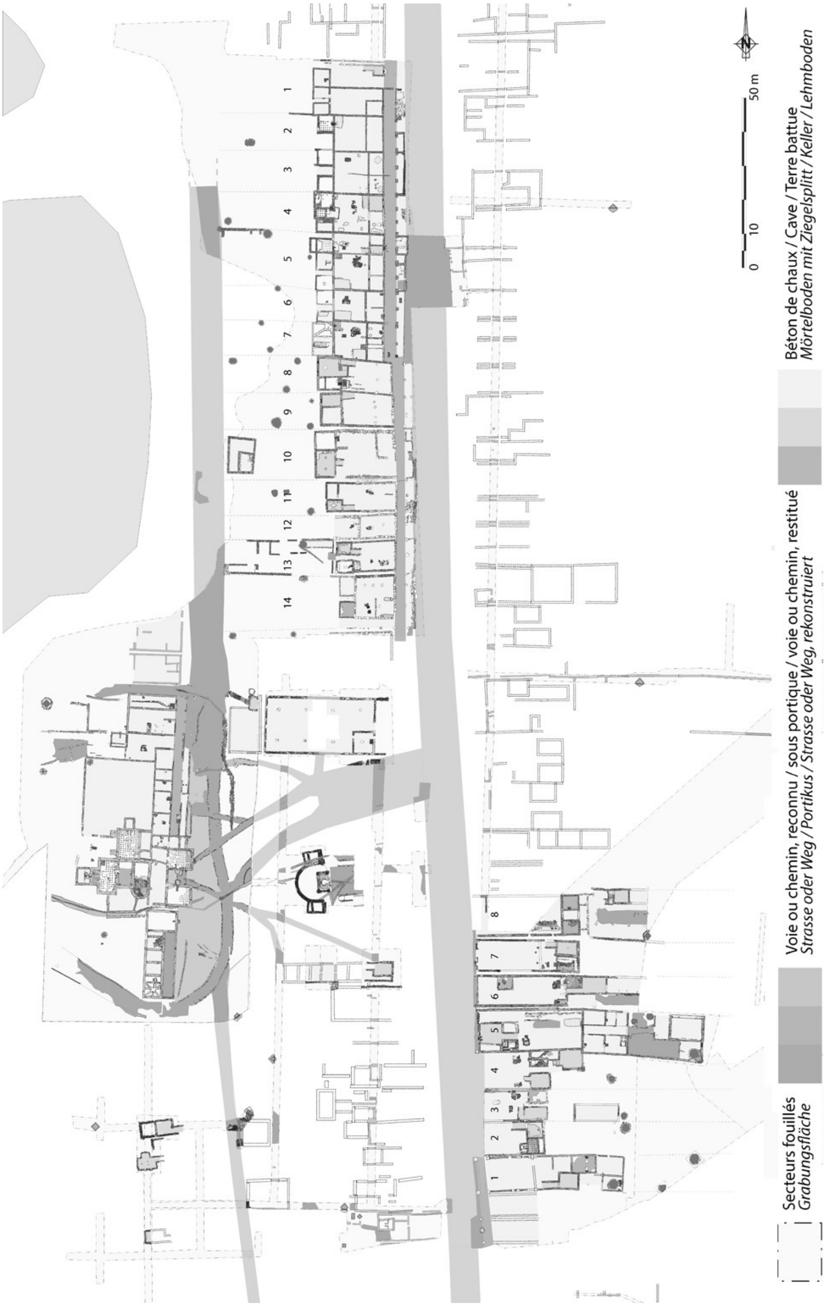

FIGURE 10.2 *Plan of the Bliesbruck-Reinheim vicus (after Petit et al. (2013))*

and *collegia* meeting halls often emphasize the urban aspect of these settlements. In Italy many small *municipia* played a similar role, frequently possessing monumental public complexes that are much larger than the residential areas (e.g. Luceria and Veleia in the Emilian Apennines, Iuvanum, Aufinum in the Abruzzo). Unlike *vici*, however, they were administratively independent and therefore can be classified as 'cities'.

Ancient Roman authors (poets, historians, lexicographers) speak of the Italian countryside as an open rural space in contrast to the crowded cities, describing it as a series of fields dotted with *villae*, scattered houses and villages (*vici*), the latter being viewed as agglomerations of *aedificia*.[9] In fact, a *vicus* was overbuilt, *aedificatus*,[10] unlike the countryside (*agri*) and its scattered, isolated buildings (*villae, villulae aedificia, tecta, casae, tuguria*).[11] The scarce epigraphic evidence suggests that life in the *vici* was a small-scale reproduction of urban life in a rural context, despite some differences and idiosyncrasies, which make that *vici* should not be simply considered as "the extension of the city in the countryside".[12] The population of *vici* included a wide range of social groups (*vicani, possessores, habitantes, inquilini, coloni vici*). Their mutual relations were highly complex and differentiated according to each group's privileges and duties, as the epigraphic sources show.[13] As Varro stated,[14] from an economic point of view the *vicus* is a useful centre of consumption for the goods produced in adjacent areas, as well as a distribution centre to cater to the basic needs of the local population (*fabri, fullones, medici, scribae* etc.). It is therefore likely that *vici* in central and northern Italy were also production and distribution centres,[15] as were those in the Transalpine provinces, although there is no clear evidence for strip buildings in Italy.

In Italy the subject of minor settlements in the Roman period has received less attention than in France, where a systematic inventory began in 1994, followed by the Archeomedes project.[16] Both inventories are continuously being updated, while debate on the utility of methods such as classification and

9 Todisco (2004).
10 Varr., *De ling. Lat.* 5. 152; Festo, s. v. *vicus* 502L; 508L; Isid., *Etym.*, 15.2.12.
11 Todisco (2011a, 12–17).
12 Todisco (2011b, 234).
13 Letta (1993); Todisco (2011a).
14 Varr., *De re rust.*1, 16.
15 Witcher (2006b; 2012). See also De Haas (this volume).
16 Petit and Mangin (1994b).

denomination as heuristic instruments is ongoing.[17] There are various reasons for the lack of systematic study in Italy. Firstly, due to environmental factors, population patterns in the various regions of the peninsula varied considerably in pre-Roman and Roman times. Italy's plains, mountains, lakes and islands facilitated connections but at the same time impeded them, allowing different settlement systems to evolve. Protohistoric social organization in Italy was quite different as well, which influenced its settlements and its urban and non-urban manifestations. Thus, most scholars have concentrated on cities and rural populations (*villae*) rather than on minor settlements. For the same reason no systematic datasets on minor settlements are available.

Secondly, although many studies on individual minor settlements have been conducted, there are only a few syntheses based on comparable archaeological data, such as detailed settlement plans and diachronic data on the expansion and evolution of built-up areas. Some extensive topographical surveys, especially in central Italy, are currently in the process of being published or have been completed.[18] Continuous occupation of urban and minor settlements is a second obstacle. As a result, very few minor settlements have been excavated in a manner sufficient to allow us to comprehend their structure and effective extent. Due to this lack of systematic data the few regional-scale syntheses that are available have had to concentrate on general characteristics of the population pattern.[19]

Epigraphic and historical sources provide an opportunity for interesting observations, especially regarding municipal statutes,[20] starting with the famous *glossa* '*vici*' in Festus' *De verborum significatione*. Festus distinguished *vici in agris, vici oppidi* and *vici in oppido*[21] and divided rural *vici* into autonomous villages (headquarters of magistrates), and villages dependent on an urban community and its magistrate. In his footsteps, and following Tarpin (2002),

17 Garmy (2002, 30–31); contributions by Cribellier, Ferdière, Leveau, Tarpin and Garmy in Cribellier and Ferdière (2012). A critical approach to the evaluation of the archaeological record for the '*agglomérations secondaires*' of north-eastern Gaul was recently proposed by Coquet et al. (2011, 83).

18 These include the Tiber Valley Project, the Ager pisanus, *"Fora, stationes, and sanctuaries: the role of minor centers in the economy of Roman central Italy"*, the Potenza valley project, and the *Ager firmanus*.

19 For the Abruzzo region, see Antonelli et al. (forthcoming); for Cisalpine Gaul, see Santoro (1999); Sena Chiesa (2003); Chrzanovski and David (2000); Chrzanovski (2007); Villicich (2007).

20 Capogrossi Colognesi and Gabba (2006); Todisco (2006).

21 According to the synthesis proposed by Todisco (2006).

such studies focused on the antagonistic/imitative relationship between cities and minor settlements, and on the surprising diversity of administrative solutions for the latter.[22]

Notwithstanding the limited nature of research into minor settlements in Roman Italy, it is possible to reconstruct their economic, productive and commercial roles by comparing data gleaned from various studies, even if their focus was a different one.

2 Two Test Regions on the Adriatic Coast: The Potential and Limitations of Analysis

Abruzzo and Friuli appear to be two ideal test cases for our purpose. They are culturally different but share the proximity to the Adriatic Sea, so that their settlement systems, production, and commerce were exposed to the same Mediterranean influences. Both regions encompass high mountains that are connected to the coast by large valleys, which articulate the territory into different geographical, economic and political units. Abruzzo may serve as a good illustration of how pre-Roman population patterns changed during the Roman conquest, which in this region began in the 4th century BC and ended in the 1st century BC. Friuli (the eastern part of *X Regio Augustea*) with its large Latin colony of Aquileia could be an example of a later and accelerated Romanization process, which was completed in the same period as it did in Abruzzo. Although differently marked by history, we can regard both regions as typical of the wider Adriatic coastal region.

Cisalpine Gaul was studied in the context of the European research project *CRAFTS 2000* (*Structure, implantation et role économique de l'artisanat en Italie et dans les provinces occidentales de l'Empire romain*), as a sub-project called *PAAR* (*Productions artisanales dans l'archéologie romaine*). Evidence for craft production was examined geographically and diachronically,[23] and data were entered into a database called Volcanus,[24] which facilitates the integration of data from different European regions. Volcanus also contains data on artisanal production in minor settlements, although with some limitations. Firstly,

22 Tarpin (2002); Capogrossi Colognesi (2002); Letta (2004); Todisco (2007).

23 PAAR was carried out between 2000 and 2005 as part of the CRAFTS European research project centering on craftsmanship in Roman Europe. The results have been partially published in Santoro (2004a; 2006), and in Amrein et al. (2012).

24 On the database, see Santoro (2004a, 58–63).

the European research group (which included Italian researchers) excluded food production from the parameters used by all project members. Instead, research focused on manufactured goods in order to assess whether or not the economic role of Roman craftsmanship was relevant, in the framework of the Finleyan orthodoxy debate. This prior omission obscured a proper view of many of the economic activities associated with minor settlements and rural areas, such as food processing. A second limitation of the database is that it only includes published data, which forms a small part of all data collected in archaeological research. Thirdly and finally, the database lists indicators of production only as urban/suburban/rural, although it allows a few more specific classifications by settlement type.[25] However, despite its limitations the PAAR data overall still provide a meaningful and realistic basis for analysis.

Other recent studies also involved Alpine minor settlements (although not systematically), investigating their economic-productive aspects as well as their settlement and housing systems.[26] This facilitated an evaluation of the connections between and integration of mountain economies and minor settlements and towns in the plains of eastern Cisalpine Gaul. The resulting data can be confronted with those collected in a recent research project entitled 'Emptor et mercator',[27] which focuses on commercial space and manifestations, and on the economic productivity of small towns. Although no systematic data collection was involved, the project's aim was to inventory published evidence on *tabernae* in minor settlements in Cisalpine Gaul and the Abruzzo. *Tabernae* are prime markers of stable commercial activities, in contrast to occasional or seasonal exchanges that could take place in *nundinae* or other fairs, which, being open-air activities, have left ambiguous and often only epigraphic or toponomastic traces. Satellite settlements of sanctuaries were also considered, since they functioned as markets during religious festivities[28] and were easily accessible from main roads. They were also involved in production, especially of ceramic votive objects.

A second quite interesting region where minor settlements were an object of study is Abruzzo. Ancient sources describe the region's pre-Roman populations as '*vicatim habitantes*'. Festus' *glossa* (s.v. *vicus*: 502L; 508L) mentions tribes like

25 Santoro (2004a, 62).
26 Santoro (1999; 2001b).
27 Santoro (forthcoming). The Chieti-Pescara University archaeological team has recently initiated research into minor settlements in the Abruzzo.
28 Gabba (1975); Letta (1992); Lo Cascio (2000).

the Marsi and Peligni as *qui villas non habent*, i.e. as being organized in a rural settlement system of scattered villages. A number of intensive survey projects have collected data on this settlement system.[29]

3 'Vicatim habitantes': Minor Settlements and Productivity in Roman Abruzzo

Minor settlements played a prominent political and economic role in the central-Adriatic area since the pre-Roman period. The orientation of the river valleys in this area varies; four run parallel from west to east (Tronto, Pescara, Sangro, Trigno rivers) and two run parallel in a north-south direction (Liri, Aterno rivers). In the pre-Roman period, the east-west valley system and a series of tracks from one valley to another formed a traffic network (roads and drove roads) facilitating communication with the major north-south Adriatic coastal region and inland roads (Fig. 10.3).

The regional economy was traditionally based on cattle breeding and sheep farming, and this system integrated mountain areas, used as high summer pastures, and coastal areas, which served as winter pastures (Fig. 10.4). Salt was produced on the coast, which is indispensable for live animals and to preserve dairy products. The import-export market was also concentrated here. Wool, leather and bone working, manufacturing and foodstuffs were the basis of the local economy. Specific studies of archaeological indicators of these production aspects are lacking, while the indicators themselves are ambiguous and ephemeral, be they structures (enclosures, barns, etc.) or objects (loom weights, spindle whorls). Agriculture flourished, wine and grain were produced in large quantities and highly interested the Romans, who conquered the territory by the end of the 4th century BC. Although ancient sources describe this coast as *importuosa litora*, archaeological evidence reveals an intensive coastal navigation system with docks servicing small boats for local commerce. Harbour structures are also attested in the estuaries of the four main rivers (Fig. 10.5). In the Roman period forestry, typical of mountain areas, contributed to the development of navigation. In Pignatara, Lettomanoppello and Interpromium, asphalt mines were found along the Via Tiburtina and the Pescara River. As attested by a loaf of asphalt (with epigraphic stamps dated to 1st cen-

29 These projects include the Iuvanum Survey Project and the Sangro Valley Project (Menozzi et al. (2008); Lock and Faustoferri (2008)).

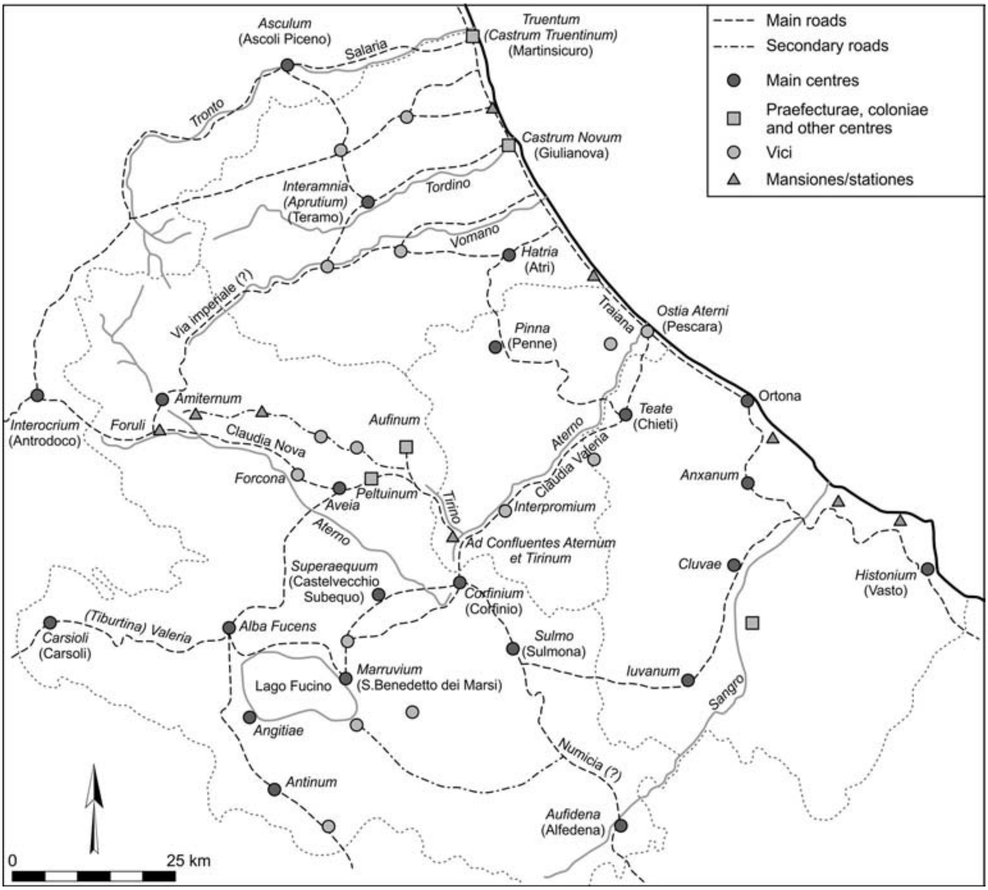

FIGURE 10.3 *Roman settlement pattern in Abruzzo (Antonelli et al. (in press))*

FIGURE 10.4 *Funerary relief from Sulmona (Abruzzo), 1st century BC*

tury BC),[30] this material was transported by land or river to the harbours, where it was used to waterproof boats, or exported. Road transport was integrated with river and sea transport as demonstrated by the activities of families like the *gens Peticia*, who operated in this sector both locally and on a Mediterranean scale (see below).

Both before and during the period of Roman colonization, the political and economic structure of the region broadly consisted of polycentric territorial entities (the *pagi*, here interpreted as city-territories),[31] each of which encompassed *vici*, fortifications, fortified refuges, farms and sanctuaries. These different settlement types were arranged in a hierarchical organization that was based on the morphology and characteristics of the individual microregion.

Many settlements lost their prominent position in the Roman period. The establishment of Roman colonies (Alba Fucens, Carseoli, Hatria, Castrum Novum) between 303 and 289 BC, the subsequent introduction of *agri coloniari*, and the improvement of the road infrastructure shifted power towards new city states. The new system radically changed existing settlements, which according to their position in the road system and with respect to the new colonies were expanded, transformed, or abandoned. Such changes can be clearly observed at sites like Amiternum-San Vittorino, Montenerodomo-Iuvanum, and Aufinum-Peltuinum.

No *vicus* in Abruzzo has yet been thoroughly excavated, so that their urban scheme cannot be analysed. Many of them were identified long ago by chance, such as Vicus Stramentarius (in Santa Maria a Vico, S. Omero, Province of Teramo), and are attested in epigraphic sources.[32] Recent rescue and preventive excavations, like those conducted by Centurelli,[33] have generated new data but failed to provide a complete picture of the settlement (Fig. 10.6).

Nonetheless, some general characteristics emerge out of the data gathered by the team of Chieti-Pescara University. The *vici* vary considerably in size, in their connections to main roads and ports, and in the presence of artisanal activities. Besides *forum* buildings with shops surrounding a square, other spaces for permanent commerce (*tabernae*) are less common, possibly because they have not been recognized archaeologically. Many of the *vici* are located

30 CIL IX, 3072. Staffa (2004, 144; 2006b, 45).

31 Antonelli et al. (forthcoming).

32 Staffa (1996, 283–285).

33 Excavations have unearthed a substantial part of this *vicus*, on a branch of the Claudia Nova road. The buildings date to the Republican period and were constantly renovated until the Late Antique period; see D'Alessandro et al. (2011).

FIGURE 10.5 *Sea and river harbours and embankments on the Abruzzo coast (after Staffa (2002))*

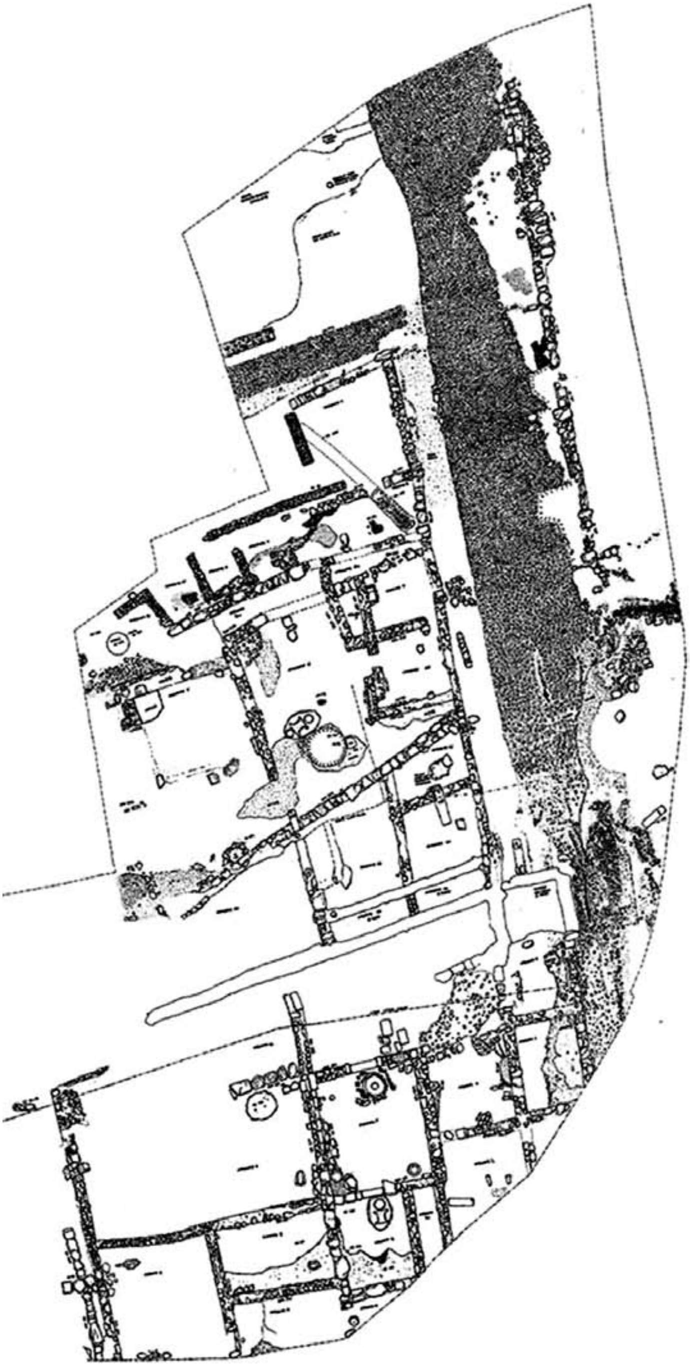

FIGURE 10.6 *Plan of the Centurelli vicus (after D'Alessandro et al. (2011))*

in the middle valley between the mountains and the coast, on main roads to new urban centres, and very often in strategic positions at main crossroads. This is the case for the aforementioned sites Vicus Stramentarius (S. Maria a Vico), San Rustico (Basciano) and Campovalano (Campli). This last *vicus*[34] is the successor of a protohistoric settlement attested by a large necropolis and situated at the junction of two important pre-Roman roads.[35]

Another series of minor settlements on the coast are associated with river estuaries (Fig. 10.5). Some of them were large indeed (Torre Cerrano, Ostia Aterni, Statio ad Salinas, Ortona, Histonium, Castrum Novum and Castrum Truentinum),[36] and all were serviceable for coastal navigation and middle range commerce. This system, already attested in pre-Roman times, underwent important changes in the Late Roman period and the subsequent Byzantine period. Ostia Aterni in particular (known today as Pescara, on the Aterno estuary) was the port of the city of Teate Marrucinorum, an important indigenous centre, and was already known in the Italic period as a meeting place for the Marrucini, Vestini and Peligni. Due to its position between Rome and the Illyrian provinces,[37] it was an important harbour in the Roman and Byzantine period for goods coming in over the Mediterranean and the Adriatic seas.[38] Torre Cerrano is an analogous site; it functioned as a port for Hatria until the high Middle Ages. These minor settlements on the coast were certainly the terminals for products from the valleys and functioned as intermediaries for other coastal markets. They were also involved in the manufacture of goods intended for short and middle range maritime trade. An example is the *statio* San Vito Chietino (Murata Bassa) along the Traiana coastal road, which in the Imperial period was the seat of a workshop specialising in Firmalampen.[39]

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34 The *vicus* is attested by both survey data and incidental finds. It is situated on the plain, north of the pre-Roman necropolis, near the church of St Peter (Staffa (1996, 258–260)). The church itself is built on top of ancient structures decorated with polychrome plaster. The church's stonework incorporates late Republican and Imperial architectonic and epigraphic fragments.

35 For the complex road system in the Abruzzo, especially in the Teramo area, see Antonelli (2008, 21–34).

36 Staffa (2006a).

37 *Itinerarium maritimum* 479, 3 W = 78 C, *"Ab Aterno Salonas in Dalmatia stadia* DCCCL*"*; Buonocore and Firpo (1998, 914).

38 See inscription CIL IX, 3338, unfortunately now lost, showing a boat in relief; CIL IX, 3337 to Cassius Hermodorus, *"naucleros qui erat in colleg(io) Serapis Salon(itano)"*, who died and was buried in Aternum (Fig. 10.5).

39 Near Castrum Novum (Giulianova) the storage area of another lamp workshop was found

Statio ad Salinas is a peculiar case. Situated north of Pescara, along the Via Traiana, it was marked by the presence of extensive salt marshes and salt works, and the salt trade was probably one of the settlement's specialities. In addition to being a *statio viaria*, it was also connected by secondary roads to the urban centres of Hadria Picena and Pinna Vestinorum. The settlement was also an amphora production site as indicated by the presence of a kiln found in close proximity to the ancient harbour. The presence of fragments of Graeco-Italic, Lamboglia 2 and Dressel 6A amphorae is an illustration of the harbour's function as a collection point for wine produced in the valley.[40]

As in the pre-Roman period, sanctuaries played a specific economic role in this territorial organization. They stood among the *vici* and functioned as territorial political centres, which is evident from the famous inscription CIL IX, 3513 (*Lex Furfensis*) in reference to the Iuppiter Liber sanctuary, dedicated by Furfenses, Taresuni and Fificulani and the inhabitants of two other unnamed *vici*. The importance of some of these sanctuaries stimulated the formation of satellite settlements, which serviced them, and the establishment of fairs and markets in association with the cult. Some of them over time developed into urban settlements, especially when they were placed on major roads or drove roads. Examples include Trebula (a village adjoining the sanctuary of Quadri),[41] Iuvanum,[42] whose pre-Roman sanctuary appears to have been absorbed into the Roman urban area, Anxa near Lucus Angitiae, and Incerulae. The latter was a pre-Roman upland settlement on the Navelli plain, relocating already in 3rd century BC towards a pagan sanctuary to Hercules Iovius situated along the drove road that would become the Via Claudia Nova. Its status as a *vicus* has been attested in inscriptions, and it continued as such for a long time. The place in the hierarchy of many *vici* in the Incerulae territorial district (*pagus*) can be reconstructed based on excavations and inscriptions. Although situated quite close to each other, the *vici* of this *pagus* fulfilled different functions along the drove road. Some were satellites of sanctuaries, others (Centurelli)

(1st century BC—Flavian period; Migliorati (2006, 175–179)). A pottery drain with Lamboglia 2 and Dressel 6A (complete as well as fragmented) amphorae was found in the area of the ancient harbour (Angeletti (2006, 175–178)), testimony to the persistence of the wine trade in this coastal settlement. Although its residential area was small, Castrum Novum was not a minor settlement since it did possess colonial status.

40 Staffa (2001, 137–139).

41 Lapenna (1996, 65–74); Tulipani (2011, 260–265).

42 Lapenna (2006).

were *mansiones*, yet others (Aveia) hegemonic, important centres.[43] Though, it should be emphasized that Italic sanctuaries did not play a role as leading economic actors like Greek sanctuaries, which ultimately served as moneylenders. Italic sanctuaries seem to have attracted private investments, satisfying both the devotees' needs and the investors' own love of ostentatious display.[44]

With the establishment of Roman territorial and administrative models in the 2nd and 1st centuries BC, the nucleated settlements were hierarchically reorganized. Some were transformed into *fora*, especially those in strategic places along valleys and roads.

The fortified centre of Monte Pallano is situated on a steep hill overlooking the Sangro valley and an important transhumance route. It possessed huge Italic walls, and in the Roman period the settlement in addition received a *forum*, a square with *tabernae* along three sides.[45] The *forum* was certainly not only used for administrative and commercial purposes (the number of houses is quite small indeed), but being situated along drove roads, it also served as a marketplace.

The Roman *municipium* of Iuvanum was quite a small town. In fact, it seems totally oversized relative to the size of its residential area. Evidently its

43 Antonelli et al. (forthcoming).

44 D'Onofrio (forthcoming), with references. An example of this type of display is the silver inscription on the base of a little bronze statue of '*Hercules in riposo*' found at the sanctuary of Hercules Curinus in Sulmona. The inscription, dating from the mid to late 1st century BC, identifies it as a gift from Peticius Marsus, *negotiator et navicularius*, a member of the *gens* Peticia well-known for their intensive commercial activities in the Mediterranean, from Carthage to the Red Sea (as other inscriptions show). This same patron is also named in an inscription on a dolium found in a shipwreck on the Ligurian coast near Diano Marina. Epigraphic sources relating to the Peticii are numerous. The oldest (last quarter of the 1st century BC) is a funerary relief from L'Aquila showing a scene of amphorae being transported on camels. The text C. Petici painted on a jar from Carthage dates to the same period (CIL VIII, 22640, 65). A bilingual text (Greek and Latin), dating to the reign of Tiberius (CIL III, 1, 29) and mentioning C. Peticius, was inscribed on a stone in the Paneion in the Hammamat valley in Egypt, along the route between Coptos, the Nile port, and Qudim el-Quseir, the Red Sea port. The sarcophagus of Marcus Primus Peticius from Peltuinum is decorated with scenes of wine production and trade (Buonocore (2007, 166)). An inscription from Sulmo refers to a Q. Peticius Habentius and his son Q. Peticius Navigius dating as late as the 4th century AD (CIL IX, 3136). On the *gens* Peticia, see also Marengo and Taborelli (2013).

45 Faustoferri and Riccitelli (2005, 871–881).

functions were also commercial, catering to a large mountain territory in addition to being a hegemonic centre due to the presence of a sanctuary.

According to A. Staffa in his many influential studies, the Roman settlement system, based on *municipia* and *villae rusticae*, fell into crisis already at the start of the 3rd century AD, mainly because it was foreign to the local socio-economic structure.[46] This crisis allegedly facilitated a revival of the pre-Roman settlement system (*pagi-vici*), which had been based on a dense network of small settlements. However, a more detailed analysis suggests that the situation was more nuanced and complex.[47] The crisis did not affect the whole territory simultaneously since a tight central administrative control was still maintained over the area. This is demonstrated by administrative reforms in the second half of the 4th century AD, which resulted in two new provinces (Valeria and Samnium).[48] When the centre of power shifted towards the eastern Mediterranean, roads and docks were restored and this coast became an important element in the network of navigation routes to Byzantium. The settlements near harbours especially benefitted like in the case of Ostia Aterni where excavations have unearthed structures from the 3rd to 4th century AD. Subsequently the same harbour was used by the Byzantines during the Greek-Gothic war,[49] and large quantities of pottery were imported from North Africa and the eastern Mediterranean from the 4th to 6th century AD, suggesting that the harbour was fully engaged in commercial exchange in late antiquity.[50]

Many documents also attest to the persistence in late antiquity of a lively transmarine commerce. During the reign of Constantine a wealthy dealer in marble (λιθένπορος) from Nicomedia, Aurelius Andronicus, and his wife Fortuna were buried in the aforementioned *vicus* of Campovalano, in a Proconnesian-marble sarcophagus decorated with episodes from the life of St Peter.[51] The presence and (probable) activity of this wealthy marble entrepreneur in the area is understandable in view of the *vicus*' favourable position on the road between Ausculum and Interamna Praetuttiorum, with direct links to

46 For urban centres, see Staffa (2006a, 449–452); for *villae*, which already at the start of the 3rd century AD show clear signs of abandonment, see Staffa (2000, 47–56). According to Staffa the situation in the coastal regions was different, since towns here lived longer until the 6th century AD.

47 Antonelli et al. (forthcoming).

48 Iasiello (2007, 39).

49 Staffa (1997, 192–195).

50 Antonelli et al. (forthcoming).

51 It was discovered in the 18th century near the (in origin palaeo-Christian) church of St Peter.

Castrum Novum (Giulianova). The surrounding territory also encompassed many rich *villae*, which since the Imperial period had been lavishly decorated with oriental marbles.[52]

Minor settlements in the central valley, which include *vici* as well as *mansiones* (Incerulae, Campovalano, Furfo, Centurelli, Bazzano, Pitinum),[53] not only survived into late antiquity but were restored, as the reconstruction of Roman buildings suggests, albeit using recycled or more perishable materials.

As the case of Friuli will demonstrate, our knowledge of settlement continuity and discontinuity in the Abruzzo uplands still relies on weak data, mostly collected during early, pioneering surveys. A gap between the pre-Roman occupation and the medieval reoccupation (the chronology of the latter is uncertain) has traditionally been accepted as a fact. A Roman phase, however, is often undocumented, which rather seems to support an interpretative model of an abandonment of upland settlements and their replacement by *vici* and scattered rural houses in the plains. The reoccupation of upland settlements in the Abruzzo as *castra* during the Greek-Gothic war is attested by literary sources (Procopius, Georgius Cyprius) and by the presence of Christian buildings in them. However, a systematic revision of excavation and survey data from upland sites is now being carried out by a team from the *Ecole Française de Rome*, and some results have already been published.[54] Similar to Friuli, in Abruzzo a number of sites survived throughout the Roman period, although within a different settlement hierarchy and with different functions than before. Some sites were reduced in status but not entirely dismantled; they probably continued to function in relation to pasturage, although this will hardly show up in the archaeological record.

4 Vici and Productivity in Cisalpine Gaul: A Different Situation

Cultural and ethnical differences led to entirely different Romanization processes in the western and eastern Cisalpine areas. Among the *Veneti* the process was a peaceful one, but among *Ligures* it was violent and destructive. This induced the Romans to adopt different strategies and to apply different legal and administrative solutions in both areas. They were skilful negotiators, grant-

52 Agostini and Rossi (2006, 145–147).

53 Antonelli et al. (forthcoming), with references.

54 Bourdin and D'Ercole (2014).

ing or denying alliances and legal status, and using this as a tool to rule and control. The different approaches also affected local economic and productive organizations as well as fiscal trade policies, which is illustrated by the different tax systems introduced in the western and eastern Alpine zones (*quadragesima galliarum* and *adriaticum portorium*).

Romanization also involved changes in the settlement system as cities with proto-historic roots suddenly had to co-exist with new colonial settlements. Land was re-partitioned in order to establish colonial rural estates, thus in effect inserting a new hierarchy into existing local settlement systems. The latter phenomenon can also be observed in Abruzzo, albeit at an earlier stage. Another similarity with Abruzzo is the integration of the economies of the mountains and of the plain with enormous economic consequences that had been inconceivable before. In the mid-2nd century BC a transversal road was constructed, the Via Postumia, linking the two economic and cultural basins of the Adriatic and the Tyrrhenian, which were separated by the Apennines and, consequently, had developed along very different lines. Adriatic cultural and economic growth was the result of the penetration and distribution of products and ideas reaching the Alpine zone from the sea via the Po, in fact turning the Po valley into an extension of the Mediterranean. Likewise, on the Tyrrhenian side, an integrated system of ports and roadways connected a harsh and marginal region with the Mediterranean world. In the final stages of the process, the Augustan reform acknowledged local differences by distinguishing four different regions (Fig. 10.7).

At the beginning of the 1st century AD, the persistence of indigenous traditions was still expressed in language, writing, and dress. The population lived in large urban centres, small cities (*municipia*), *vici* and other minor settlements, and in a vast number of *villae*. Together, the centuriation and the agricultural system adopted from *villae*, reinforced by the extraordinary road network, resulted in a flourishing agricultural economy. This enabled the Romans to maintain firm control and to organize the vast plain, which to them presented a completely new situation. Around the mid-1st century BC Cicero was able to enthusiastically state: "*Gallia Cisalpina … flos Italiae*". One century later, Pliny and Martial would extol the flourishing craftsmanship and fine products of the region, such as wool, wine, wood and ceramics. Funerary monuments express the pride of Cisalpine craftsmen and salesmen whilst celebrating their economic activities and showing a unique freedom of self-representation (Fig. 10.8). They also document the economic and social status achieved by the artisans and salesmen in this 'provincial' society. Some examples of them climbing the social ladder among the entrepreneurial classes and of the participation of Cisalpine elites in production activities are clearly manifest in historic

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FIGURE 10.7 *The four Augustean Regions of Northern Italy (after Fraccaro (1947))*

NORICUM
CARNIC ALPS
TRIDENTINE ALPS
JULIAN VENETIAN
Mt. Caruanca
VENETIA
Aquileia
Tergeste
Altinum
Patavium
Verona
GULF OF TERGESTE
ISTRIA
Pola
Polaticum Pr.
GULF OF FLANONA
PANNONIA
DALMATIA
ILLYRICUM
ALPS
Ravenna
Ariminum
Pisaurum
Ancona
GAUL
Bononia
Florentia
Arretium
Cortona
Perusia
Clusium
Volsinii
UMBRIA
PICENUM
Mt. Fiscellus
Asculum
Hadria
Reate
Amiternum
Corfinium
Paeligni
Marsi
Carseoli
Praeneste
Tusculum
Hernici
Veii
Caere
ROME
Ostia
ADRIATIC SEA
SEA
Sena Gallica
Firmum
Spoletium
Interamna
Narnia
Falerii
Tarquinii
Boviannum vetus
Caraceni
Frentani

FIGURE 10.8 *Funerary stele of wine merchant Veiquasius Optatus, 1st century AD (Museo Archeologico di Torino)*

and epigraphic sources.[55] In their 'visibility' the Cisalpine craftsmen resembled their Transalpine colleagues; from a cultural and social point of view, the Cisalpine province actually served as a model for Transalpine provinces. The carriers of this influence were legionaries, salesmen, craftsmen, and *coloni*.

Yet, the case of the Cisalpine economy is still the topic of a lively debate. The most likely interpretation may be that proposed by Foraboschi,[56] who envisages a 'mosaic' of local economies. Archaeological research suggests that this local and regional view may be enhanced by the possibilities of trade within and beyond the Alpine zone particularly during the 1st century AD as studies of the material from Magdalensberg and other Transalpine urban centres have shown.[57] The region also preserved some distinctive aspects up to late antiquity, such as the stability of its small rural estates and its widespread craftsmanship, in contrast with the tendency towards *latifundia* in central and southern Italy. Therefore, a more thorough examination of the settlement patterns and archaeological evidence for production and circulation might produce interesting results. This would be far from easy, however, as excavations carried out in this region are often old and pay little attention to the faint traces of industrial activity other than ceramics. There is a certain level of imbalance in the research carried out so far in the north-east and north-west, the former area having a tradition of fairly systematic studies while in the latter such studies have only recently begun.

In the 1990s, with the rise of preventive archaeology, the compilation of regional archaeological maps and inventories of various important archaeological collections have facilitated a reassessment of the available information on small towns. Some conferences have been dedicated to patterns of urbanization, mountain settlements, and *suburbia*.[58] Since 2000, two extensive research projects and their respective publications have focussed on minor settlements in Cisalpine Gaul and their associated artisanal production.[59]

55 Bandelli (1991; 2002; 2009).

56 Foraboschi (1992).

57 Framarin and Joris (2007). The exchange of ceramic goods between Eporedia and Magdalensberg, for example, was confirmed by archeometric analysis.

58 On preventive archaeology, see regional cartography; E.g. *CAL* 1991–1994. For archaeological expositions about ancient North Italy, see *La Venetia nell'area padano-danubiana* (1990); *Milano Capitale dell'Impero* (1990); *Tesori della Postumia* (1998); Marini Calvani et al. (2000); De Marinis and Spadea (2004). For conferences and workshops, see Santoro (1999); Verzár Bass (2001); Ortalli and Heinzelmann (2003); Brecciaroli Taborelli (2007); Villicich (2007); Annibaletto and Ghedini (2009); Maggi (2011).

59 AMARIS—*altri modi dell'abitare romano in Cisalpina* (PRIN 2005); CRAFTS-PAAR: *arti-*

So far, archaeologists and historians have mainly concentrated on the economic and productive aspects of the *villa romana*, the most important element of the Cisalpine economy, especially in terms of ceramic production and building materials. Literary sources (Pliny, Martial) mention the popularity and quality of the pottery produced in northern Italy.[60] A detailed morphological classification in combination with archaeometric analysis might identify the associated workshops, although these have hardly ever been located. Many of the kilns, which were discovered in great numbers, produced bricks in connection with building activities.[61] The few archaeologically studied ceramic production sites were part of urban sites. Archeologically, no minor settlements that were exclusively industrial are known, unlike in Gaul. As for products other than ceramics (e.g. metalwork and textiles), only vague information is available on production sites and workshop organization.

In the context of PAAR, we tried to quantify the economic relevance of these crafts by carrying out a systematic inventory of the archaeological record and of literary and epigraphic sources.[62] In general, our data is relatively detailed with regard to pottery production, which is more visible archaeologically, and the textile sector, which is often mentioned in sources for this region. Cities have also produced archaeological evidence for craft activities: Mediolanum[63] for metalworking, Brixia[64] for stone working, Patavium[65] for ceramic production and Aquileia and the wider Venetia region[66] for textiles. Certain stages in the production process, especially the processing of raw materials into semi-finished products, are likely to have been located in minor settlements, although this can rarely be proven.

Despite the fact that, from an economic point of view, the region was flourishing and dynamic, archaeological data on production sites is poor. Basic ques-

gianato e produzione nella Cisalpina romana (Culture 2000, PRIN 2007); see also *La lana nella Cisalpina romana*, a project conducted by the Ateneo di Padova from 2009 to 2011.

60 Pliny, N.H. XXXV, 160, mentions the reputation of the terracotta goblets produced in Hasta, Pollentia and Mutina during the Flavian period. In his poetry Martial describes two of the cities mentioned by Pliny, Pollentia and Mutina, as ceramic production hubs in the same period.

61 The production sites at Cremona, Ravenna and Faenza are exceptions (Lavizzari Pedrazzini (1998)). Mazzeo Saracino (2000) doubts these locations are production sites. For a synthesis see Santoro (2001a).

62 Santoro (2006).

63 For the sites of Via Rugabella, Piazza Erculea, Via Moneta, see Grassi (2007).

64 Bianchi (2004).

65 Cipriano and Mazzocchin (2010).

66 Busana et al. (2012).

tions relating to the social role of craftsmen (as manifested in the funerary monuments), productive organization (specifically the characteristics and size of workshops), localization of different production phases and systems of product collection and distribution (i.e. contacts and synergies, relations between rural areas, urban centres and minor settlements) remain open.

In the final decades of the 20th century a number of Italian studies investigated minor settlements in northern Italy.[67] However, very few *vici* (Angera[68] and Bedriacum[69] are exceptions; Fig. 10.9) were studied in sufficient detail to allow the identification of urban layouts and *officinae* and *tabernae*, the main obstacle being that most of these small towns are still occupied today.

The key topic of research into minor settlements in northern Italy is their chronological development, more specifically the issues of continuity or discontinuity between the pre-Roman and Roman period and of continuity/transformation/abandonment in late antiquity. Mansuelli's model, proposed in 1982, postulates that pre-Roman upland centres were abandoned during the Romanization process and that new *vici* were established in the plain. During late antiquity, settlements were relocated to the hills for reasons of security. As was mentioned earlier, the same model has been applied to Abruzzo.

67 Mansuelli (1982); Calbi et al. (1993). The Italian contribution to the Bliesbruck-Reinheim conference dealt with administrative aspects on the basis of epigraphic rather than archaeological evidence (Zaccaria and Maggi (1994)).

68 The large *vicus* of Angera (perhaps Vicus Sebuinus) is a good example of a *vicus* with an urban plan, separate residential, public and productive quarters and monumental urban display (a *forum*, a temple with luxurious capitals). A *forum* and *porticus* were also found in Luceria, a small town (perhaps a *vicus*) in the Emilian Apennines.

69 The best known *vicus* in the Po Valley is Bedriacum, situated along the *Via Postumia* near Cremona, a *colonia optimo iure* of which it was probably a dependent. Ten years of excavations by G. Sena Chiesa, P. Lavizzari and M.T. Grassi have uncovered a large sector of this settlement near the Oglio River, an important trade route between Lombardia and Emilia in a border region inhabited by Celts (Insubres), Ligurians and Padan Etrurians. It was founded after the centuriation of the territory in 190 BC and the construction of the Via Postumia in 148 BC as a trade centre for the distribution of Mediterranean goods to the settlers and as a pottery production centre. In the early Imperial period two main axes imposed structure onto the site, with different orientations and parallel plots separated by *ambitus*. It is impossible to identify *porticus* or *tabernae* based on the facades; two houses had storage cellars. The only known house shop dates to the mid-2nd century AD and continued to function until the mid-3rd century AD. After a great crisis in the 4th and 5th centuries AD, trade activities were resumed with the construction of new, small buildings on a different orientation. The site's ultimate decline and abandonment dates to the early 6th century AD (Bacchetta and Grassi (2010)).

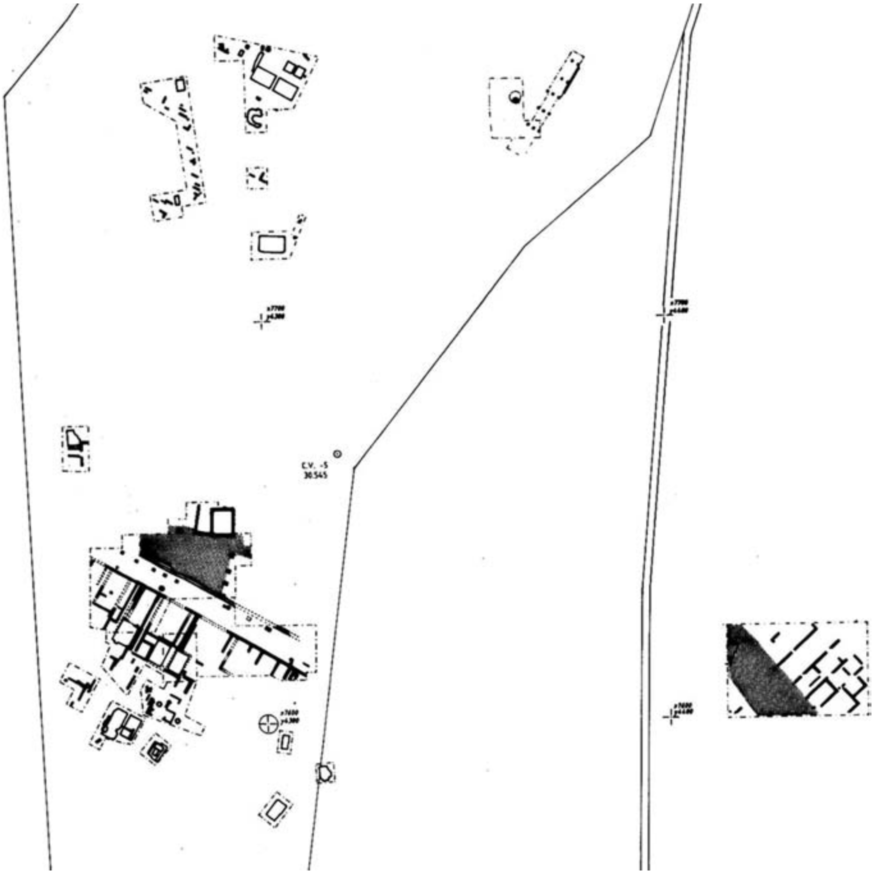


FIGURE 10.9 *Plan of the Bedriacum—Calvatone vicus (after Bacchetta and Grassi (2010))*

A second research topic concerns the diverse functions of minor settlements, in particular as collection and distribution centres for agricultural products, centres of craft production, and local market towns.

With regard to chronology, AMARIS and PAAR produced slightly divergent results from those predicted by Mansuelli's model. In the Alpine regions and the Apennines, some upland villages were abandoned but many continued in some fashion from the pre-Roman to the Roman period, presumably because they were still instrumental to maintaining territorial control in the Roman Imperial period (1st–3rd centuries AD); the many references to *latrones* in Alpine inscriptions testify to the necessity.[70] In some cases settlement conti-

70 See for example CIL V, 41. Tiberius attempted to suppress banditry by introducing a

nuity entailed a functional change in late antiquity with sites that formerly had economic functions now acquiring military roles as *castella-refugia*.

On the other hand, small towns, *vici*, and other minor settlements in the plains and along major roads also reveal a degree of continuity accompanied by change in late antiquity. Archaeological surveys have shown that most of the Roman *vici* and *fora* in the plains were a continuation of pre-Roman predecessors situated along protohistoric routes.[71] In this extensive region it was again the road network that conditioned settlement location. During the Romanization process the economic relevance of minor centres complemented their role as intermediaries between indigenous peoples and *coloni* as epigraphic sources and the archaeological record clearly show. In Cisalpine Gaul changes in legal status are observable in the Roman period (minor settlements becoming *municipia*, and vice versa) as well as a re-organization of local settlement hierarchies (as in Abruzzo).[72]

Research into the economy of minor settlements in the Alpine uplands has been even more scant. Roman Piemonte in particular has been neglected for a long time, despite its significance as a passage towards Gallia, both from an

series of police measures in order to gain territorial control; see Suet. Aug. 32 and Tib. 37: *grassaturas dispositis per opportuna loca stationibus inhibuit*. This phrase attributes an unusual degree of territorial paramilitary control to *stationes*.

71 Clastidium in the Placentia territory was probably the oldest Roman *vicus* along a road axis. Initially founded as an *oppidum* of the Anares tribe, it was destroyed by the Romans in 197 BC. Re-established along the Via Postumia, apparently without an urban layout, this *vicus* survived until the 5th century AD.

72 A case in point is Fidentia in Emilia. Since the ancient centre is beneath the modern city, our knowledge of it is fragmentary. It was founded in the 2nd century BC as part of an administrative re-organization after the construction of the Via Aemilia consularis. The town had a regular layout oriented on the Via Aemilia; however, parts of the *forum* area are still unexplored, and no *tabernae* and *officinae* have yet been identified. Its initial legal status may have been a *forum* or a *praefectura*, a territorial administrative centre marked by viritane distributions. During the reign of Augustus it became a *municipium*, and Vespasian granted it the honorary title of *colonia*, but from the 2nd century AD it underwent a crisis, which also affected other minor settlements along the Via Aemilia, such as Tannetum, Florentiola and Claterna. The crisis was probably caused by a new policy, which led to the concentration of administrative activities in main urban centres, in this case Parma, of which Fidentia in the 3rd century AD was a dependent. The *Itinerarium Antonini* labels Fidentiola as a *vicus*. In the 4th century AD, it experienced an economic revival that was based on the salt trade, favoured by its location on the main route to the new capital at Milan. In the early Imperial phase Fidentia was a re-distribution centre, which is attested by imports such as Arretine pottery and glass from Aquileia. Craft production (pottery and bronze items) is assumed but lacks an archaeological basis.

urban (the great urban layout of the Augustan colonies Augusta Taurinorum and Augusta Praetoria) and a commercial point of view (bronze industry, pottery in Hastia and Pollentia). In contrast, the eastern Alpine region and its earlier natural function as a border[73] have triggered some remarkable archaeological interest, following in the footsteps of pioneering studies on the Austrian and Slovenian sides of the mountains. As the work carried out by Gabba[74] illustrates, approaching Roman literary sources from an ideological perspective reveals their negative bias regarding the Alpine economy. Ancient authors (Polybius, Strabo, Appian) were part of the Roman elite, and while their cultural outlook was essentially urban, their interests were in agriculture and hostile to untamed nature.[75] Therefore, they appraised the new territories in terms of their urbanization potential and did not value different settlement forms, other than as reduced versions or imitations of cities. From this perspective the wild and hostile Alpine region obviously stood in stark contrast with the plain, where true *civitas* with all its economic and social life could be found. Appalled by the harsh conditions in the mountains, ancient authors blamed a *spanis trophé*, the lack of food among Alpine populations, for the banditry that targeted travelling merchants.[76] The Romans waged a bitter war in the Apennines against the Ligures and later against the Alpine peoples. This war was depicted as a *bellum iustum* against *Tropheum Alpium*, a conquest that tamed nature and built cities, sowing the seed of civilization in poor and forlorn lands, which therefore received the gifts of infrastructure, administrative organization, and legal integration.

According to this picture, the post-Augustan representation of the Alps and the eastern zone in particular can be summarized as a juxtaposition of the wealthy city (e.g. Aquileia), on the one hand, with its train of subordinate minor settlements situated along the easiest routes through the mountains (Strabo IV, 6, 6) and the interior territories on the other, geographically distant from the city and characterized by an isolated and marginal economy, prone to depopulation as a result of migration towards the plain (Cassius Dio, LIV 11, 5).

73 The eastern Alps already served as a frontier when Caesar was in power. In the Augustan period the creation of the *cursus publicus* enabled hilltop settlements to play a strategic role. After the mid-2nd century AD, and following the invasions of German tribes such as the Quadi and Marcomanni, military control of the area was systematically strengthened by the construction of fortresses and watchtowers.

74 Gabba (1994, 267–273, 275–289).

75 Fedeli (1990, 72–80); Tarpin (1990, 97–120); Pellizzari (2001, 81–93).

76 Strabo, IV, 6, 8–10; See also Appian, Bell. III. 15.43.

Such a negative assessment of the economy of mountain areas (particularly the Alps) has continued to influence the concept of mountain economies in contemporary studies,[77] at least until Giardina's admirable work, which focused on forest economy in southern Italy.[78] Giardina challenged the traditional restrictive assessment by proposing a complex model of exploitation, which integrated the mountains, the plain and the coastal economy. This model of integrated economies also applies to the Alpine region, particularly the east, where we can locate the system of production chains and of the individual steps in production processes. We can do so thanks to a better definition of production factors (raw materials, waste materials, semi-finished products, locally specific products and structures) using Van der Leeuw's model of ancient crafts as the point of departure.[79] These models have changed our view of the alpine economy and re-defined our interpretation of settlement patterns, particularly in Friuli (Fig. 10.10).[80]

Minor settlements were part of the production chain for metal, wool, and wood; they played various roles in the clustering of activities and the first and intermediate steps in the processing of raw materials. In cases where thorough excavations have been carried out (Castelraimondo, Raveo, Verzegnis, Montereale Valcellina), archaeological data have confirmed this hypothesis, although the final steps in the production process were normally carried out in cities. Production chains recorded in the Friuli area include forest exploitation (wood, pitch), pig breeding (salted meat), sheep farming (wool, textile production, leather, dairy products, meat preserved in fat), stone works (from quarrying to lime production and construction work). A part of these products supplied the army, which guaranteed continuity in demand and made investments in these sectors profitable.

Alpine mineral sources should also be considered.[81] Silver, copper and iron occur in large quantities on both sides of the Alps, whereas sources of gold are limited to the western Alps with the exception of the mysterious gold

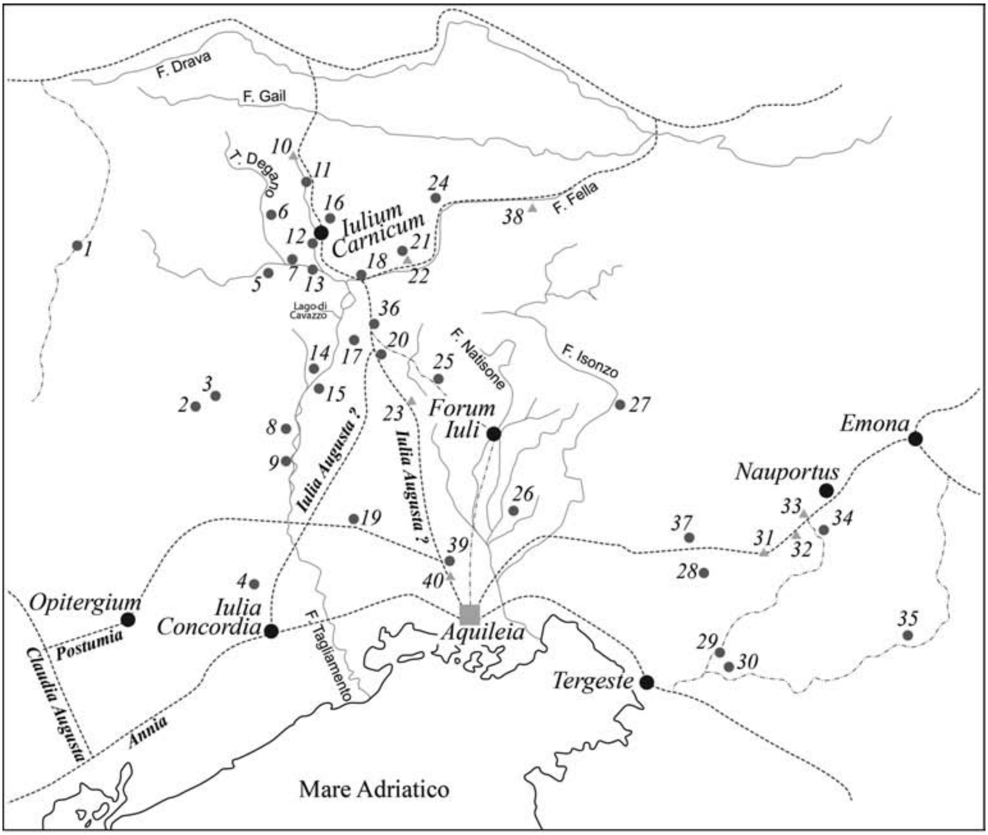
77 See Prieur (1968), Barruol (1969) and Pauli (1980, 158 ff.); in a more precise and cautious form, Segard (2007) with reference to the western Alps. This negative assessment is part of the current debate on mountain economies (Horden and Purcell (2000); Shipley and Salmon (1996); Leveau (1990)).

78 Giardina (1981, 100–110; 1997, 141–143).

79 Van der Leeuw and Pritchard (1984).

80 Santoro (2001b; 2007). References to studies on the Alpine area can be found in Butti Ronchetti (2007).

81 Piana Agostinetti (1996).



- main roads
- secondary roads
- main centres
- *coloniae*
- minor centers
- *mansiones/stationes*

1. Lagole
2. Monterealevalcellina (*Caelina?*)
3. Maniago
4. Sesto al Reghena
5. Socchieve
6. Ovaro
7. Invillino
8. Spilimbergo
9. Gradisca sul Cosa
10. *Statio temaviensis* (Timau)
11. Sutrio
12. Sezza (*Segesta?*)
13. Verzegnis
14. Castelraimondo
15. Ragogna
16. Arta Terme
17. Osoppo
18. Amaro
19. Codroipo (*Quadrivium*)
20. Artenia (Artegna)
21. Moggio
22. *Statio plorucensis* (Resiutta)
23. *Statio ad tricesimum* (Tricesimo)
24. Pontebba
25. Nimis
26. Cormons
27. S. Lucia di Tolmino - Most na Soči
28. Vipacco - Vipava
29. Divaccia - Divaca
30. S. Canzian del Carso
31. *Statio ad pirum summas alpes*
32. *Statio in alpe Iulia*
33. *Statio longaticum*
34. Kalce
35. Stari trg
36. Glemona (Gemona)
37. Aidussina - Ajdovščina
38. *Mansio Larice*
39. Sevegliano
40. *Statio* Terzo di Aquileia

FIGURE 10.10 *Roman settlements in the mountains of Friuli* (*Santoro* (*2007*))

mine of the Taurisci.[82] However, the exploitation of mineral sources and the associated metal production chains were negatively affected by the conquest of other regions that were richer in minerals, rendering the Alpine mines less profitable. The interruption of exploitation had a severe impact on some minor settlements, where intermediate processing of minerals before the Imperial period has been attested (e.g. Castelraimondo).[83]

Excavations and other research conducted over the last twenty years in the eastern Alps, from Friuli to Austria and Slovenia, have increased the volume of relevant archaeological information on minor settlements, not only *vici* but also *burgi, castella, aedificia*, etc., many of which are now well known (Castelraimondo, Verzegnis, Raveo, Montereale V., Kobarid, etc). Recently, archaeological materials and archaeometric analysis have increasingly received attention as a means to establish the origin and composition of finds.

In the eastern part of Cisalpine Gaul, known in ancient literary sources as *Venetorum Angulus*, the pre-Roman political, economic and cultural situation was complex; the area underwent a series of rapid changes during the Romanization period in the 2nd century BC. A concentration of large and important Roman cities (Brixia, Verona, Vicentia, Altinum, Patavium, Aquileia) reflects the need to control and manage this wealthy and populous territory in which the Roman elite invested specifically. From the second half of the 2nd century AD onwards, the regional economy appears to have been affected by the military presence, which in turn was due to invasions by non-Roman peoples.

In the pre-Roman phase the local settlement system was oriented towards a series of coastal *emporia* (which later became Concordia, Aquileia and Tergeste), urban centres further inland (Oderzo), and minor upland settlements functioning as political centres for the various tribes and populations scattered over villages and farms. In this situation, the Roman decision to reinforce Aquileia to become the central place for the whole territory was bold, but eventually successful. It was already the site of an *emporion* where Illyrians used to sell their leather, cattle and slaves in exchange for oil and wine,[84] and archaeological investigations have revealed its important position in the pre-Roman period. The site was selected for the foundation of a Roman colony and ultimately preferred over another Venetic centre, which was to become the town of Concordia, a *terminus* on the route between the mountains and the sea. Concordia, as well as its satellite settlements (e.g. Montereale Valcellina),

82 Šašel (1974–1975).

83 Santoro Bianchi and Giumilia Mair (2007).

84 Strabo V, 1, 8.

already possessed urban characteristics, but towards the end of the 3rd century BC also showed symptoms of decline.[85] The Roman preference for Aquileia was a crucial factor in the distribution of the population in Friuli.[86] In addition to the traditional north-south route connecting the coast (Concordia) to Noricum via the Tagliamento river and the minor valleys of But and Fella, a new north-east route was created (Natisone/Isonzo/Vipacco) leading to the *emporia* of Ocra, Nauportus and Emona. Along this route a *vicus* was established at Most na Soči, as well as several way stations: Mutatio ad Undecimum (Gradisca d'Isonzo), Pons Sonti, Ad Fornulos (near Bilje, equipped with kilns and active up to c. AD 425), and Fluvius Frigidus.[87] From the outset the two areas were organized along two different axes, and their valleys (Tagliamento and Isonzo) followed different trajectories in terms of economic growth and population development. The first was more oriented towards the civilian and commercial traffic across the Transalpine route (with two possible terminuses: Aguntum and Virunum);[88] the other appears to have been more thinly populated and was involved in *saltus* and probably also mineral exploitation.[89] The new town of Aquileia was at the heart of a network of routes and economic relations, whereas Concordia was peripheral. This network tapped into the larger system of hill settlements with their earlier roots and traditions, although now hierarchically and functionally re-organized. In the Isonzo area the abandonment of proto-historic sites, which had already started in the mid-2nd century BC, accelerated in the Imperial period and was accompanied by deforestation, a repartitioning of land, and the establishment of *villae rusticae*. At first these *villae* were involved in forestry and later in the cultivation of olives, grapes, and other fruits in addition to the exploitation of resources such as pitch and even ice.[90] Along the Tagliamento valley, the evolution of upland settlements

85 It is not a general phenomenon: Adria, another Venetian *emporion*, and Oderzo, its corresponding inland urban centre, show economic and population growth from the end of the 4th century BC onward and continuing throughout 3rd century BC (Bianchin Citton (1995); Tirelli (2004)). For Adria, see Colonna (1993, 140–141).

86 Bandelli (1988).

87 A *saltus publicus* took place at a crossing of mountain routes where mountain products arrived (wood, coal, lime, resin). The conformation of the route responds to the needs to change the system of transportation before the steep way towards Col and the dangerous paths of Hrušika plateau (Panciera (1957)).

88 Montagnari Kokelj et al. (2007, particularly 102–103).

89 See Montagnari Kokelj (2007, 92).

90 From the ice cave in the plateau of Trnovki gozd by the fast-flowing waters of the Isonzo river to Aquileia; Vidrih Perko and Zbona Trkman (2004, 29–30).

and their relations with the new *vici* and *fora*, created in the plain and valley, was even more complex. In the economic model recently proposed by historians for this region based on a closer examination of literary and epigraphic sources, sheep farming plays a central role, involving routes of vertical transhumance from the coast to the mountain pastures at high altitude.[91] Sheep farming and cattle breeding had always been practiced in the region, but in the Roman period they became especially important in hilly and mountainous areas as centuriation made grazing in the plains impossible. This rural economy was also linked to revenues generated by supplying the army during the Roman conquest of the Balkans and Transalpine Europe. This additional factor determined the economic and political engagement of Roman powerful families in this region, repeating the system of integrated economic interests successfully developed earlier in central Italy.[92]

5 Conclusions

Analysis and comparison of the archaeological and epigraphic data from Friuli and Abruzzo show that the settlement strategies, administrative tools and economic control first applied during the Romanization process (2nd and 1st centuries BC) in northern Italy and afterwards beyond the Alps were the result of a progressively larger, more refined body of political, administrative and technical expertise. This was tested and developed during the conquest and the management of central Italy from the 4th to the 1st century BC. This process, paralleled by the two regions in the final two centuries of the Republic, progressively diminished the differences between the central and northern Adriatic regions, resulting in a more or less culturally, politically and economically homogeneous situation after the Augustan period. The implementation of an integrated system of exploitation in the mountains, intermediate plains and coasts was based on the economic role of minor settlements in various important production chains (wood, stone, wool, metal, etc.). Their diversity in dimensions, shape, equipment, status, and function was eminently relevant. In any case they represented another way of living in the Roman territories, one that was nucleated and complex and simultaneously complementary to connecting both urban and dispersed settlements.

91 Garnsey (1998); Bandelli (1999); Bonetto (1999).

92 On the development and rationalization of this sector in Friuli after the experiences in central Italy and Venetia, and on the cultural background of Aquileia coloni, see Chiabà (2003).

PART 4

Commercialization

CHAPTER 11

Wine and Amphorae in Campania in the Hellenistic Age: The Case of Ischia

Gloria Olcese

1 Introduction

This chapter presents research on Graeco-Italic amphorae from Ischia, Lacco Ameno (ancient Pithecusae) (Fig. 11.1) and other areas in south-central Italy that were part of the *Immensa Aequora* Project, which consists of a series of interconnected sub-projects.[1] Their purpose is to study the production and distribution of ceramics made in south-central Tyrrhenian Italy, using archaeological and archaeometric techniques, with a focus on the period between the 4th century BC and the 1st century AD. This period encompasses the initial stages of Roman commerce in the course of Rome's rise to the stature of a Mediterranean power, which is still little understood. Beginning in the 4th century BC, the conquests of the Roman Republic had created conditions for enrichment as well as a new powerful class that could benefit from the opportunities offered by expansion.[2] The project's final goal is to study and reconstruct aspects of the ancient economy, starting with ceramics, whilst maintaining an overall historical perspective on the archaeological and archaeometric data.[3]

Archaeology has produced little real information so far on Campanian wine between the 4th and 3rd centuries BC, particularly regarding the identities of the producers and sellers, and the role played by Rome.[4] Ancient Graeco-Italic

1 The results of studies of the pottery produced in this area are still awaiting publication in a number of archaeological and archaeometric fora (i.e. Olcese (2010); Olcese et al. (2013); Olcese (2015)). For the necropoleis of Pithecusae, see the fundamental works of Buchner and Ridgway (1993) and Ridgway (1984). For the *Immensa Aequora* Project, see www.immensaaequora.org.

2 Clemente (1990).

3 This project arose from discussions with Maurice Picon. A number of archaeometrists, including I. Iliopoulos, G. Montana, G. Thierrin Michael and V. Thirion Merle, participated in this project, collaborating over various time periods and working from different perspectives.

4 Of this opinion are Van der Mersch (2001), Morel (1986) and Tchernia (1986), who emphasized that certain aspects of the production of wine in 3rd century BC Campania are not clear; in particular, the identity of the producers, that of the sellers, and the role played by Rome.

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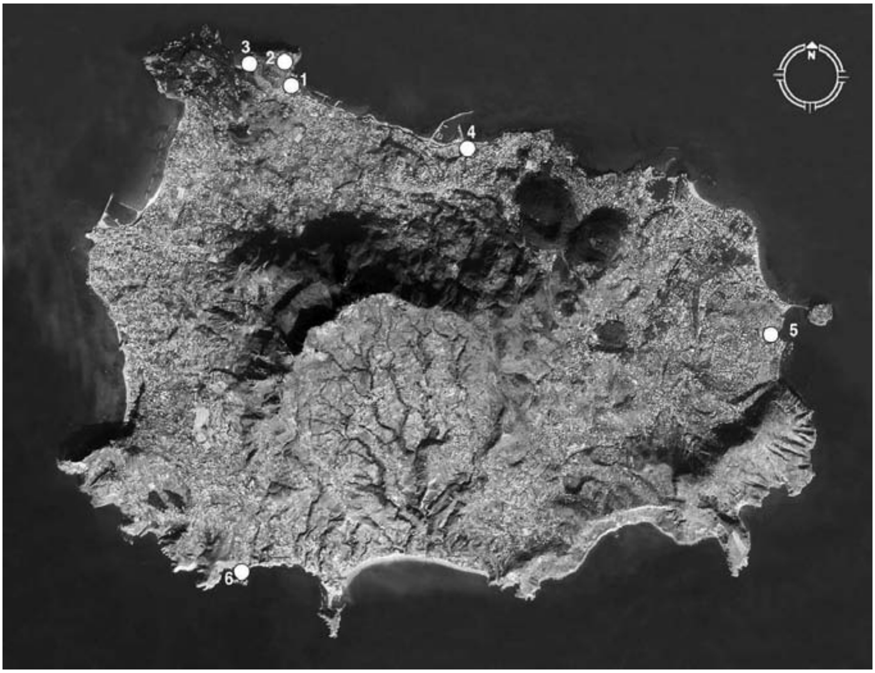


FIGURE 11.1 *Map of Ischia (after Olcese (2010, 11)). 1: Lacco Ameno, Santa Restituta; 2: Lacco Ameno, Monte Vico; 3: Lacco Ameno, Baia di San Montano; 4: Casamicciola; 5: Cartaromana; 6: Punta Chiarito*

amphorae are important indicators of the economic and commercial conditions of this period, in which Rome turned its attention south and extended its influence to Neapolis and the Gulf of Naples, acting as a stabilizing force in the Tyrrhenian Sea. During this period Neapolis, taking advantage of its alliance with Rome following the *Foedus Aequum* of 326 BC, saw its foreign trade relations notably expand, a fact evidenced also by coinage and by an increase in activity at the Neapolitan mint.[5]

Studies of the Graeco-Italic amphorae produced at Ischia, specifically archaeometric analyses, and comparisons with amphorae from Neapolis have generated data on the production and trade of wine in the Gulf of Naples as well as on the initial phase of Roman economic expansion in the western Mediterranean. In the following pages, results of the Ischia studies will be discussed in the form of preliminary observations on the production site of Santa Restituta, the amphorae produced there, their stamps, and the implications these finds

5 On the social and economic history of Neapolis, see Lepore (1952). On the coinage of Neapolis, see Cantilena et al. (1986).

have for our understanding of the systems of production and exchange of the late 4th and 3rd centuries BC, including the role of local elites and Rome. In the conclusion, I will also comment on the questions that have emerged from this study and require more exhaustive research by specialists from different fields, supplemented by new investigations that are not limited to the study of material culture.

2 Graeco-Italic Amphorae from Ischia and the Gulf of Naples

Many areas along the Tyrrhenian coast of Italy were involved in the production of wine, and in recent years there have been many efforts to study them. Campania and the broader region of the Gulf of Naples as the point of origin of Graeco-Italic amphorae (and more importantly, of the high quality wine they contained) increasingly asserted themselves between the late 4th and the early 3rd century BC. The Gulf of Naples formed a unique enclave for centuries, thanks to its favourable climate, the fertility of its land, its strategic position, and its artisanal tradition, which was well developed since the time of the region's colonization. Pithecusae was known for its fertility, and was situated at the centre of very busy trade routes, having been rightly labelled as "the gateway to the rich traffic of the Tyrrhenian".[6]

Ischia's *eukarpia* is mentioned in ancient sources,[7] and the island's influence on wine production has been significant until recent times (Fig. 11.2). A growing body of research on features associated with wine production on the island is currently unearthing new data. One may reasonably assume that amphora production continued at Ischia from the Archaic period up until late Antiquity, albeit with some interruptions.[8] More generally, all types of Graeco-Italic amphorae, from Types II to VI,[9] were produced in the Gulf of Naples. Their production may have increased from the second half of the 4th century BC onwards in the wake of the spread of the Aminea vine.[10]

At Neapolis, grape vines were cultivated on the hills above the city, and the wine-making traditions of the Gulf (probably introduced during the Euboean

6 Raviola (1995, 122).

7 *Strabo* V, IV.9; Mele (1986, 360–361 and 2000, 39–43).

8 Graeco-Italic amphorae of Type II have not yet been found, and the production of Type VI is still unconfirmed.

9 On the production of MGS (Magna Grecia, Sicilia) II amphorae in Naples, see Febbraro and Giampaola (2011/12); Tagliamonte (2010).

10 Mele (1986, 360–361); *Aminaea, RE* I, II, 1835–1837.

FIGURE 11.2 *Vineyards on Ischia* (*after Olcese* (*2010, 17*))

colonization as the cult of Dionysus and the terminology related to wine suggest) remained alive and present throughout the Republican period.[11] In the 4th and 3rd centuries BC, specialized arboreal cultivation was widespread not only in the coastal regions of Campania, but also in the nearby territories of Benevento and Volturno.[12]

The relationship between Ischia and Neapolis emerged clearly from a study of Ischian pottery as well as from ancient sources, which claimed that a connection existed between the two centres. Ongoing research will clarify whether the first phase of Ischian production (associated with the ancient Graeco-Italic Types III and IV identified at the kilns of Santa Restituta) also involved Neapolitan workshops as is suggested by certain deposits found recently during excavations for the construction of the metro line.[13] Other information may also emerge from the new studies, specifically on the administrative and economic relations between Neapolis and Ischia in the 4th and 3rd century BC.

11 Mele (1986, 360–361 and 2000).

12 Cerchiai (1995, 201 and 137). The existence of wine production in the Archaic period has already been documented for the region of Stabiae and the area of Deserto di S. Agata dei Due Golfi on the Sorrentine peninsula.

13 Currently studied by L. Pugliese and S. Febbraro. For the Graeco-Italic amphorae of Neapolis, see now Pugliese (2014).

3 The Artisans' Quarter of Santa Restituta and Graeco-Italic Amphorae

The artisans' quarter of Santa Restituta at Lacco Ameno, already established at the time of the Euboean colonization,[14] was probably renovated and expanded in the second half of the 4th century BC. The expansion included the establishment of new kilns for the production of pottery, bricks and amphorae.[15] The position of the kilns, close to the sea, the hills where the grape production took place, and near suitable clay beds, fits into a logistical production pattern already identified (also for the Hellenistic period) in other areas as well as on some of the Greek islands.[16]

Graeco-Italic amphorae dominate in the area of Santa Restituta with analyzed fragments belonging to Types III, IV, V and VI (fig. 11.3). Most of the material, however, consists of fragmentary stamped handles that are often unidentifiable as to the exact type. Some identical stamps from other sites, Neapolis, Aleria, Gela and Punic Sicily, as well as in North Africa, in addition to those documented in the Filicudi-F wreck discovered off the Aeolian islands, help to assign these stamps to amphorae of recognizable typology.[17]

Chemical and mineralogical analyses have revealed that the amphorae found at Ischia and Neapolis differ in composition from those found in other geographic areas of Campania; e.g. those from the area of Vesuvius, or north-central Campania are distinct in several respects.[18]

14 As thermoluminescence analyses of some kilns seem to confirm (Martini and Silinka in Olcese (2017)).

15 Olcese et al. (1996); Olcese (2010 and 2015); Olcese (2017) for the new data. Data on urban development in Campania in the late 4th century BC were collected for the Sarno Valley and Pompeii (see De Caro (1986)). Pompeii was one of the *civitates foederatae* of the Roman Republic. New excavations have unearthed some kilns under the Casa dei Cubicoli, which were turning out rooftiles (Pesando (2010 with bibliography)).

16 For Rhodes (but also Thasos and Cnidos) see Empereur and Picon (1986); Picon and Garlan (1986).

17 Graeco-Italic Amphorae Type IV, with some stamps that correspond to those of Ischia and Neapolis. For instance, the stamp "ΖΩ" is well attested at Ischia but only on fragmentary handles; nonetheless it was possible to link it to MGS Type IV, thanks to an unbroken amphora from the cargo of the Filicudi-F shipwreck (Olcese (2010, and fig. 11.6 infra)).

18 For the composition of amphorae from the Vesuvian area, see Peacock and Williams (1986) and Thierrin Michael (1992). For those from north-central Campania, see Olcese et al. (2013) and Picon (1988, 255).

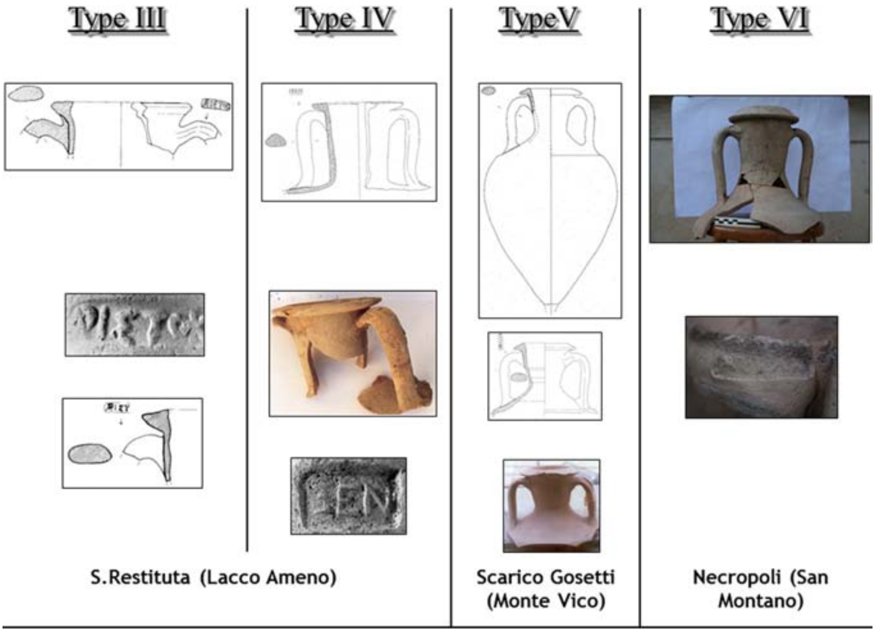


FIGURE 11.3 *Typology of the Graeco-Italic amphorae found in Ischia (after Olcese (2010, 24))*

Chemical analyses (XRF) of Campanian amphorae[19] revealed the existence of groups and subgroups pointing to production at multiple workshops. One of these, Group D, can be attributed to Ischia based on archaeological and chemical laboratory data (Fig. 11.4). The other group of samples, which is labelled E and F and possibly includes material from multiple workshops, is derived from amphorae found at Naples (discovered during the excavation of the Metro trenches) as well as other parts of the Mediterranean.

Mineralogical analyses proved to be crucial, since they support the connection between the chemically defined groups and their possible sites of origin. Based on the initial analyses, the amphorae in circulation may be attributed to the Gulf of Naples in general and perhaps to Naples itself. However, the question of the origin of the clay is still unanswered.

The ascription of some Graeco-Italic amphorae to the Gulf of Naples from 3rd century BC shipwrecks (i.e. the Tour Fondue and Bon Capò wrecks, perhaps also Meloria-A), which has been confirmed by mineralogical analyses, is significant as it provides evidence for the distribution of wine from Campa-

19 The complete dataset has been presented in Olcese (2010, Chapters VII/VIII). See also Thirion Merle (2010) and Iliopoulos (2010).

nia, probably from Naples, to the north-western part of the Mediterranean and along the routes leading to France and the Iberian Peninsula. To this mineralogical evidence can be added, but this has as of yet been only partially verified in the laboratory.[20]

The epigraphic stamps on the Ischia amphorae are of great interest, since they inform us about the organization of production and the economic and social realities on the island during the Hellenistic period (Fig. 11.5). Our understanding of Ischian stamps from this period is much more limited than it is in the case of stamps found in Greece, where each centre seems to have developed its own stamping system.[21]

It is not known when exactly the practice of stamping Graeco-Italic amphorae started in Ischia and in Campania in general.[22] Stamps have been found at the kiln site of Santa Restituta, on Types III, III/VI, and IV amphorae, which can be dated to the second half of the 4th and the first decades of the 3rd century BC. More than three hundred stamps have been identified that bear Greek (some probably Ionico-Euboean) and Oscan names, written in Greek letters. The practice of stamping seems to have been connected to sea-borne wine trade.

In some cases the names have been progressively truncated, a phenomenon possibly linked to the internal organization of the production; the exact significance of which is still unknown. Occasionally the names on the amphora stamps are the same as those found on bricks, sometimes preceded by the abbreviation ΔΗ (*demosia*). Different interpretations have been suggested for such abbreviations, which may indicate pottery and/or brick production controlled by the state, or private production on behalf of the state.[23]

4 Graeco-Italic Amphorae: Tracing the Production System of Ischia and the Gulf of Naples in the Hellenistic Period

The wine trade, especially in quality wines, may have been both the foundation of great profits and the object of strict rules, control, and regulation by the

20 Mineralogical analysis of a sample of an amphora Type MGS V–V/VI from the Terrasini-B shipwreck showing the Latin *graffito* L. AIMILIO (applied before firing) revealed a fabric composition similar to Campanian amphorae (Illiopoulos in Olcese et al. (2013)). For the Terrasini shipwreck, see Purpura (1974); Giustolisi (1975).

21 Garlan (1993, 184).

22 Archaic amphorae found at Ischia bear no stamps (Di Sandro (1986)).

23 Olcese (2010, chapter VI); Garlan (2001, 190–198); Raviola (1995, 118); Small (2006, 192).

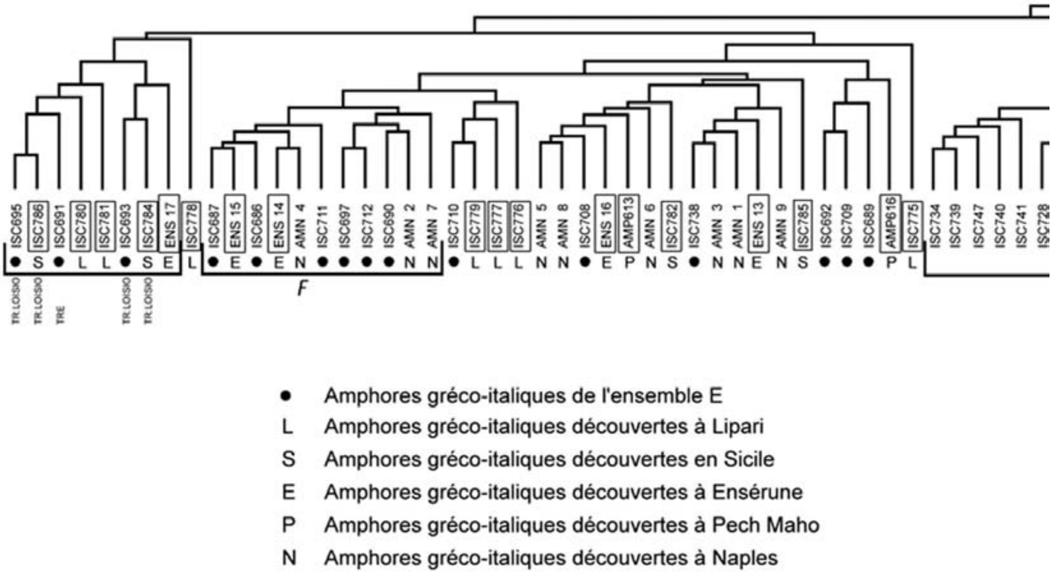


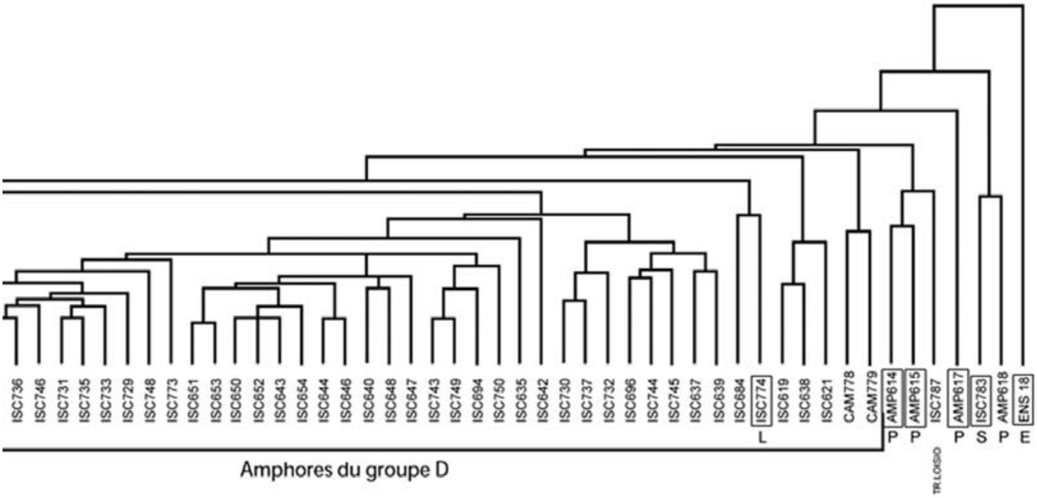
FIGURE 11.4 *Main groups of amphorae from Ischia and Naples as identified by cluster analysis of the chemical characterization (XRF) (figure by Thirion Merle, after Olcese (2010, 196))*

Roman state, sometimes in the form of protectionism.[24] As the study of Greek wine (e.g. Thasos)[25] has shown, the wine trade was accompanied by new fiscal measures on the island and in other ports that were also centres of wine production. From the 5th century BC, there was a class of vine-growers, owners or renters with facilities for the production of wine, as well as a class of merchants who possessed capital and plied their maritime trade.[26]

24 Salviat (1986, 183 ff.) describes a series of measures ensuring the protection of Thasos wines, which according to the author benefited from an exemption, while other wines—such as those produced in the coastal regions of Thracia—were probably not allowed to be loaded onto Thasian ships.

25 Salviat (1986, 181). The publication illustrates the case of Thasos and some laws recorded in written sources.

26 Salviat (1986, 182 and note 66).



The most useful information for reconstructing the system of wine production is generated by the analysis of production facilities and amphora stamps. Similar data may be obtained by cross-examining epigraphic, archaeological, and archaeometric information. Data from Ischia and Neapolis reveal the presence of Graeco-Italic amphorae with similar characteristics at both sites. In addition, certain stamps occur at both Ischia and Neapolis, some types being more prevalent at one site than at the other.

Ongoing laboratory testing will shed more light on the characteristics of the amphorae produced at Neapolis.[27] It may even verify the existence of an analogous and parallel system of production at the two sites that was dependent on customs/common laws and involved the same historical figures, perhaps public ones. Such a scenario could be similar to the system that is described for some of the Greek islands in the Hellenistic period, such as Rhodes. Studies by Empereur and Picon, which were based on laboratory analyses, showed that amphorae with shared morphological characteristics

27 Same as the case of mineralogical group II, see Iliopoulos (2010, 202–203).

FIGURE 11.5 *Various stamps in Greek on Ischian Graeco-Italic amphorae (after Olcese (2010, 30))*

were produced at several island and mainland sites (the so-called *peraiai*) and in the integrated territories institutionally dominated by Rhodes in order to package the product central to the local economic system: Rhodian wine.[28]

Pithecusae, situated on a commercial route that had been intensively used for centuries, is an example of an insular economy probably similar to that of Thasos that was also based on trade. In the Hellenistic period, the island was the *peraia* of Neapolis (as it had been since the late 5th century BC), which allowed it to experience an economic boom.[29] The organization of the wine production on the island and the mainland appears to have been the same.

Finally, G. Finkielsztejn's recent studies of amphorae[30] and their stamps in the Hellenistic period in Greece offer interesting points of reflection. The author demonstrated that a relationship might have existed in the Hellenistic-Greek mind between coinage, weights and measures, and the manufacturing of amphorae (through their stamps), as expressions of a guarantee on the part of the city administration. Greek sources refer to units of measure (*étalons*) for *sekomata*, weights, and hypothetically, also for amphorae, which were perhaps used by multiple cities that formed a *koinè* and traded together.

Amphorae with triangular or *champignon* rims, produced in the south-east Aegean in the 4th and 3rd centuries BC, are a case in point.[31] The adoption of the same form of amphora at multiple centres of production in a single region may reflect a shared decision to use a specific unit of volume on the part of the members of the community.[32] This agreement may have been the result of a common policy for commercial relations in the Mediterranean in the late 4th and the early 3rd century BC.

It may not be a coincidence that in the Gulf of Naples the Graeco-Italic amphora was adopted in the late 4th/early 3rd century BC, a type that, although having its own specific forms, resembles the Greek type *champignon* rim. Hypothetically, this choice may indicate that similar receptacles were being adopted throughout the same area.

28 Empereur and Picon (1989).

29 Raviola (1995, 122–124) clarifies the similarities and differences; in the case of Naples and Ischia, the principal administrative centre was on the mainland. The implication of this hypothesis is that in this period (i.e. 4th to 3rd century BC) Ischia belonged to Naples.

30 Garlan (2000, 76–78); Finkielsztejn (2006, 28).

31 See the studies of Empereur, Picon, Lawall and Finkielsztejn.

32 Finkielsztejn (2002) and (2006).

5 Individuals, Graeco-Italic Amphorae, and Wine in the Gulf of Naples

What was the role of the Neapolitan elite and of influential Roman families in the wine trade? Van der Mersch considers the aristocracy of Campania as being implicated in the production of wine.[33] Indeed, the influence and economic success of the Campanian elite must have been considerable already by the 3rd century BC; the Punic Wars are regarded as having been instrumental for the expansionist pretensions of the Campanian upper classes and the defence of their own interests. With respect to this idea, Lancel remarks that the *Atilii* of Campania held the consulship seven times between 267 and 245 BC.[34]

It is useful to reconsider and combine the available typological, epigraphic and archaeometric information in an attempt to identify some of the individual members of the "enterprising economic class of Neapolis".[35] The names of these individuals—ΑΝΔΡΩΝ, ΑΝΔΡΩΝΟΣ, ΑCΚΛΗ, ΕΥΞΕΝΟΣ, ΖΩ, ΖΟΙΛΟΣ, ΧΑΡ, ΧΑΡΜΗΣ, ΧΑΠΜΕΩ, ΧΑΡΜΕ, ΜΕΓ, ΜΑΙΩ, ΝΥΨΙ, ΤΡΕ, ΤΡΕΒΙΟΣ, ΤΡΕΒΙΩ (either complete or abbreviated)—appear on amphorae Types IV and V.[36] The fabrics of these types are compatible with the chemical composition of the clays of Ischia and, more generally, the area of the Gulf of Naples. Most of these individuals were Greek, perhaps members of the founding elites of Neapolis, and a few were Oscan.[37] They may have been involved in the production and trade of a wide range of wines. Recently, as a result of combining epigraphic evidence and historical data, the list of individuals could be expanded after a few more names emerged from studies of Graeco-Italic vases.[38]

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33 Van der Mersch (2001, 187). Earlier he had already considered the issue: "faut il considérer ΕΥΞΕΝΟΣ, Γ. Ἀρίστων, *Tr. Loisio* et autres Στάιος Τράγων comme de producteurs/négociants campaniens? C'est possible mais pas entièrement sûr" (Van der Mersch (1994, 145)).

34 Lancel (1992, 383); Heurgon (1969, 344).

35 See Lepore's contribution in *Storia di Napoli* I, 248.

36 See also Olcese (2010, chapter V).

37 Some names mentioned in funerary inscriptions from Neapolis are identical to those appearing on amphorae stamps, although they could also be homonyms: Leiwo (1994); Miranda (1995, vol. II—see e.g. the Ipogeo dei Cristallini).

38 A few stamps are in Latin, and studies of the Graeco-Italic vases bearing them are still ongoing.

6 The Circulation of Ancient Graeco-Italic Amphorae from the Gulf of Naples, an Ongoing Project

The available archaeological and archaeometric data can inform us about various aspects of the circulation of Graeco-Italic amphorae from the Gulf of Naples.

Firstly, wine from the Gulf of Naples[39] and the amphorae in which it was transported were being produced and circulated in the late 4th and early 3rd century BC (Fig. 11.6 for the amphorae stamped ΖΩ and ΖΟΙΛ).[40] The wine was evidently of a high quality and was produced mostly for overseas trade and moved in containers, which were being kept track of through their stamps. The finds from two shipwrecks (Filicudi-F and Secca di Capistello) off the Aeolian Islands serve as an example of the wide distribution. Coincidentally, the few Graeco-Italic amphora types that date from the late 4th to the first half of the 3rd century BC (Types IV and V) originate from the Gulf of Naples area. As was explained above, in the next period the trade in products from Campania intensified, perhaps in the wake of the increase in pottery production sites.[41]

Secondly, the transport of agricultural goods was accompanied by ceramic products in this phase, as finds from Aeolian excavations show.[42]

Thirdly, the attribution of Graeco-Italic amphorae and stamps to the Gulf of Naples, based on laboratory analysis, makes it easier to reconstruct the distribution patterns of Neapolitan wine in the southern Tyrrhenian area, Sicily, and even North Africa, a century before the export 'boom' of Campanian products, which is usually placed after the Second Punic War.[43] This insufficiently studied phenomenon is often accompanied by the presence of black gloss ware

39 The definition includes the production of Ischia and of Neapolis, and perhaps other sites as well. Not much is known about the situation in the area of Neapolis; before 326, the *Chora* of Neapolis excluding the islands was quite small, i.e. 17 km^2 (Cassola (1986, 59)).

40 Some scholars believe that Roman wine production in Campania began only in the second quarter of the 2nd century BC, e.g. Carandini (1989c). According to Mele (1986) production and circulation of Campanian wine started in the 5th century BC.

41 Morel (2009, 77).

42 Unfortunately, it is impossible at present to attribute the black gloss ware pottery from the shipwreck with any certainty to a particular area. These forms are very common in Magna Graecia and Sicily and the material from the shipwreck has not yet been analyzed. Analyses on fairly similar pottery from the necropolis of Lipari have produced mixed results (Campania, Sicily, unidentified areas).

43 See e.g. data from Carthage (Bechtold (2007a). A somewhat different situation seems to emerge from the ceramic materials found in the harbour than what recent excavations suggest: Wolff (1986a and b).

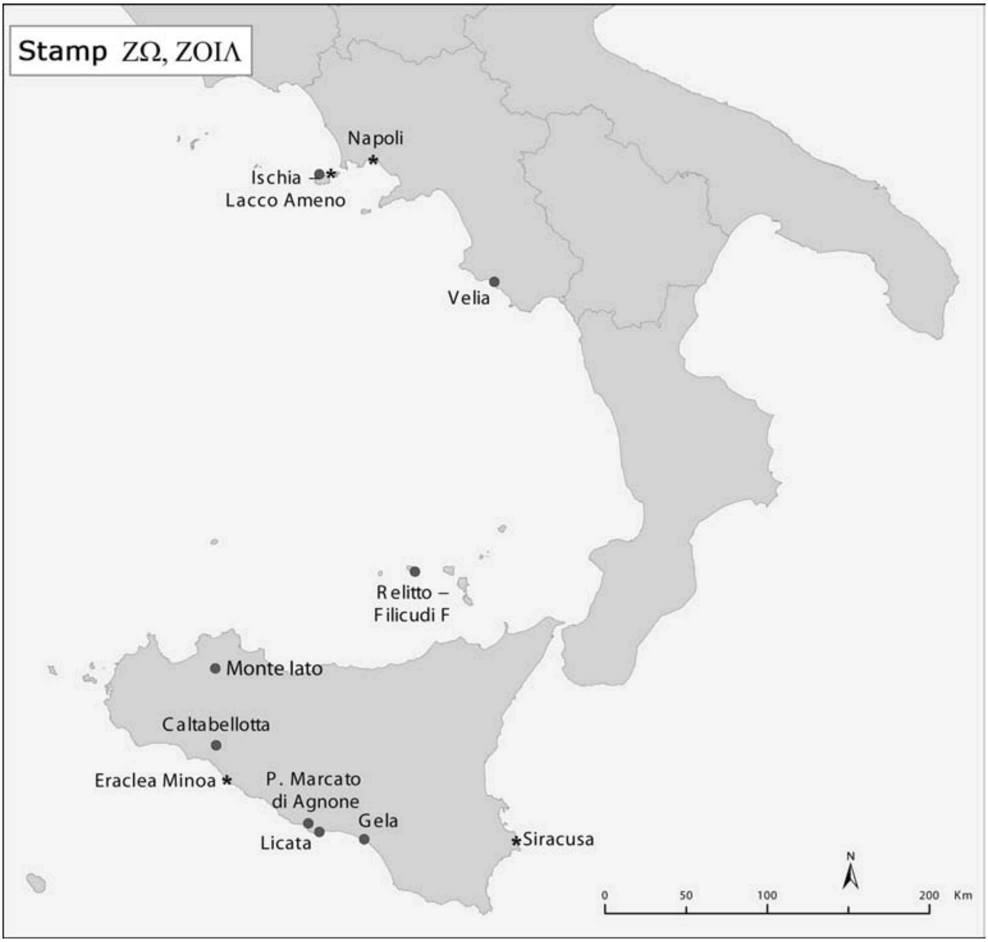

FIGURE 11.6 *Distribution of Graeco-Italic amphorae type IV stamped ΖΩ (• in the map) or ΖΟΙΛ (∗ in the map) (after Olcese (2010, 129))*

pottery (that Morel defined as 'archaic' and/or 'primitive' 'Campana-A' in his first publications).[44] This has been documented at Punic sites in western Sicily, but also in the north-west Mediterranean, Ensérune in southern France, Aleria in Corsica, and North Africa.[45] The distribution pattern of black gloss ware from Cales in the 3rd century BC ('Byrsa Class 661', attributed to workshops

44 See for example Morel (1980a). The author attributes this production to Ischia, dating it to the 4th to 3rd century BC ('A primitive') and 280–220 BC ('A Archaic') respectively.

45 In Sicily, 'Archaic' Campanian Type-A pottery has been identified among 'early' imports from different areas in Campania, which along with 'Calenian' pottery attests to the

of Cales),[46] documented at Carthage and Lilybaeum in the early 3rd century BC,[47] is starting to become clearer. A few Sicilian sites, such as Gela, Selinunte, Camarina, and Liparis, document this early trade in ceramics, showing similar characteristics and probably having a Campanian production origin. Laboratory analyses have already helped in identifying some of the production sites of such ceramics. Other contexts, such as the *oppida* of Pech Maho and Ensérune in southern France or Aleria in Corsica, have produced more data on the circulation of Campanian products in the 3rd century BC. The distribution of amphorae and black gloss ware pottery therefore seems to indicate that the early commercial introduction of products from the Gulf of Naples may have already reached North Africa, Tunisia and Libya (e.g. possibly Mellita and Sabratha).[48]

Fourthly, it seems that in the earliest distribution phase of vessels from the Gulf of Naples, the route that led to Sicily, and perhaps also North Africa, also passed through Capo Lilibeo. In the late 4th and the 3rd century BC, Punic centres or sites under Punic influence (Eryx, Lilybaeum, Selinunte) on the coast, as well as some situated more inland (Caltabellotta, Monte Adranone, or Monte Iato), were locations where the wine and other amphora-packed products from the Gulf arrived and were sorted. These activities coincided with the period immediately after the third treaty between Rome and Carthage (306 BC).

At some sites (e.g. Monte Adranone) Campanian and Osco-Campanian coins have been found,[49] which Breglia linked to the presence of Campanian mercenaries on the island as part of the build-up to the First Punic War and the advance of Pyrrhus (278) during which the army left Campania.[50] Data on material culture may perhaps shed some light on the third Romano-Carthaginian treaty.[51] The Sicilian markets were closed to Rome, and there was

existence of direct relations between different parts of Campania and Punic Sicily and North Africa. See in this regard Bechtold (1999) on Lilybaeum and Bechtold (2007a). On black gloss ware pottery found at Carthage, see Chelbi (1992).

46 Morel and Picon (1994); Morel (1998, 246). On the presence of Calenian pottery at Carthage (class Byrsa-661), see Pedroni (2001); Bechtold (2007b).

47 Bechtold (2007a).

48 Caputo (1959); Bisi (1969/70); Morel (1980b); De Miro and Fiorentini (1977, 42: Fig. 57, Tomb 5).

49 Fiorentini (1998); De Miro and Fiorentini (1982/83).

50 Breglia (1952b, 90 ff.). These are *quadrigati* found in Selinunte, which was destroyed in 250 BC (an *ante quem* date for the discovered hoards). The Campanian military emigration assumed a permanent character in Sicily as revealed by several studies, e.g. Tagliamonte (1999 and 2006, with refs.); De Cesare (2006).

51 The 348 BC treaty between Rome and Carthage already hinted at maritime interests not

a desire to limit the distribution of products, perhaps even those from the Gulf of Naples and from Campania in general, deriving from businessmen who were pushing for an invasion of the markets controlled by Carthage.[52]

Finally, the distribution of products from Campania in the following period, after the mid-3rd century BC, is better understood. Following the capture of Agrigento (262 BC) and Lilybaeum (241 BC), Roman traffic with the southern Mediterranean, including Sicily, increased. New archaeometric studies have allowed the attribution of Graeco-Italic amphorae from various consumption sites, sometimes stamped in Greek, to the Gulf of Naples.[53]

7 Discussion: Ischia, Neapolis and Rome

The study of Graeco-Italic amphorae from Ischia and Neapolis contributes to our understanding of the relationships that were forged between Rome, Neapolis, and the Gulf of Naples in the late 4th and throughout the 3rd century BC. The exploitation and organization of crafts on Pithecusae presupposed "economic capacities that were larger than local ones, through investment capital and the possibility for transport and distribution of the traded product. Only a merchant and trader class such as that of Neapolis, with her shipyards, her ships, and her organization, could have explained this phenomenon".[54]

The *Foedus Aequum* between Neapolis and Rome in 326 BC made Neapolis a *civitas foederata*.[55] Henceforth, it was independent within its territory and had the right to mint coins, although in an emergency the city had to make its navy available, a clause that was fulfilled during the First Punic War.[56]

On its part, Rome in its southward expansion became a participant in commercial ventures and interests in Campania and *Magna Graecia*, beginning in

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only in the Tyrrhenian Sea, but in the western Mediterranean in general. On the Rome–Carthage treaties, see Scardigli (1991).

52 As F. Sartori wrote, "It is not purely coincidence that Neapolitan businessmen, working in multiple, diverse markets, were considered by their trade "partners" as, above all, Romans" (Sartori (1976, 92)).

53 Olcese (2010, 187–286). In general, see Van der Mersch (1994, 128–130 and 2001, 191). They are part of a body of finds that can be dated to the mid-3rd century BC and perhaps even later from the site Tour Fondue in southern France, Bon Capò, and probably also Meloria (see Olcese (2010, 187–286) and Iliopoulos (2010, 206)).

54 Lepore (1952, 313).

55 Cicero *Pro Balb.* 55; on the institutions of Neapolis see De Martino (1952).

56 Polybius, I, 20.14.

340 BC.[57] Essentially, Rome's intention to bring at least a part of the Greek world under its 'protection' emerged already in the treaty with Tarentum (c. 303 BC).[58] As Cassola explained, what mattered most to Rome was not so much the subjugation of Neapolis and Capua, for example, but rather the guaranteed collaboration with a region that was rich in industrial activity and that was open to the sea.[59] This agreement led to a monetary system that was modelled after Neapolis', which must have helped penetrate the areas controlled by that city.[60]

During its advance, Rome established contact with some important wine production areas on the Tyrrhenian coast.[61] A number of scholars claim that between the 4th and 3rd century BC, forms of agricultural exploitation were initiated in the area between Capua and the Gulf of Naples that led to a structured system of wine production[62] and that food products were exported from the newly controlled areas.[63]

Some questions that are still open pertain to the economy and production of wine: was the distribution of products from the Gulf of Naples linked to the arrival of the Romans in Campania or to the activities of Neapolis?[64] According to Morel, it was Rome rather than cities like Neapolis that initiated long-distance trade.[65] Van der Mersch dates the start of the production of 'Roman'

57 Musti (1988, 531–537). The author points to the Romano-Campanian coin production as evidence, although it is not clear if they were intended for domestic or international circulation.

58 Musti (1988, 537). This treaty included delimitation of mutual spheres of interest with Capo Lacinio as the boundary.

59 Cassola (1962, 121 ff.).

60 On Neapolis coinage, see Breglia (1952a and b) and Taliercio Mensitieri (1987).

61 Van der Mersch (2001, 187).

62 Van der Mersch (2001, 189: No. 324). De Martino (1991, 201) believes that the standard view, according to which a major agrarian transformation with more profitable crops (e.g. vineyards and olive groves) only became possible after the war with Hannibal and the subsequent afflux of slaves, needs to be revised.

63 Van der Mersch (2001, 192).

64 This hypothesis seems to be accepted by Lepore (1952, 253). On the roles of Campania, and of Naples and Ischia, see Lepore (1952, 312–313); Hesnard et al. (1989, 31).

65 "*c'est Rome, et non pas Naples (non plus qu'aucune autre cité de la Grand Grèce) qui parmi les villes d'Italie manifeste le plus d'initiative et rencontre le plus de succès dans l'exportation de céramiques vers le pays de la Méditerranée occidentale*" Morel (1986, 335). The author refers to the production and circulation of the ceramics of the *Atelier des petites estampilles* that are widely spread in the western Mediterranean between the late 4th and the early / mid 3rd century BC, almost in parallel with the first productions of amphorae of Gulf of Naples.

wines in Campania to the period between the creation of the *Ager Falernus* and the First Punic War.[66] Controlling such a production would be highly desirable to members of the influential Roman elite who were already present in the period of the *foedus* and whose interests coincided with those of powerful Campanian families.[67]

The earliest information available suggests that while Rome carried her path of conquest southward and beyond, corresponding to the construction of the Via Appia in 312–310 BC (both for military purposes and to improve relations with Capua), products from the Gulf of Naples and pottery from Campania made their way to markets along the southern Tyrrhenian coast.[68]

However, wine production and pottery manufacture had traditionally been part of life in Ischia and Naples even before both sectors were reorganized and expanded upon the arrival of the Romans.[69] In the 1950s, E. Lepore produced some seminal publications on the history of Naples in the Hellenistic period. Although few archaeological data were available to him, his writings reflect an acute intuition, which has since been confirmed by the study of finds from Ischia and also by recent discoveries at Neapolis.[70] He underscored the very relevant industrial activity at Pithecusae, as well as at Neapolis, that in his view were linked to the "fairly large local economic capacities" of the mint and to the intensive level of production of ceramics, which he designated as 'industrial'. These further illuminate the technical and cultural influence that the 'city' managed to hold over even Rome.[71] Neapolis preserved its own institutions and the use of the Greek language for a long time after 326 BC, even after it had obtained citizenship, which has led some historians to believe that the area never was truly 'Romanized'.[72]

Following the alliance with Rome that united influential Roman families and the leaders of Naples (i.e. the Greek merchant class), the Gulf of Naples found itself in a privileged position of economic development and growth in the trade

66 Van der Mersch (2001, 190).

67 Frederiksen (1984, 232); Van der Mersch (2001, 190).

68 The Aleria finds include pottery from different areas as was already pointed out by Jehasse and Jehasse (1973 and 2001).

69 Van der Mersch connects part of the production of Graeco-Italic amphorae of MGS Type II to southern Campania (Van der Mersch (1994, 69)). Recent research revealed that the production of Type II is also attested in Naples (Febbraro and Giampaola (2011/12, 356–360).

70 Lepore (1952, 241 ff.).

71 Lepore (1952, 253).

72 De Martino (1952, 340).

and craft sectors, thanks to the loyalty the Neapolitans demonstrated towards Rome.[73] The port of Neapolis contained one of the most important harbour installations of the 4th and early to mid 3rd century BC.[74] Efforts to dredge the harbour floor during recent research by the *Soprintendenza Archeologica di Napoli* revealed material, which testifies to the intensive use of the harbour basin in the years following Neapolis' entrance into the Roman sphere of influence.[75]

Beginning in the 4th century BC and for over a hundred years "… Naples was, in full luxuriance and without rivalry or limitations, a centre of economic gravity for Campania and also the Western Mediterranean … The moneyed classes found themselves at full liberty for economic initiatives, which transformed into merchant activities. The Hellenistic city revolved around the port and her commercial activities were not only import and transport, but also the export of, for example, pottery produced thanks to the clay from Pithecusae".[76]

We now know that in reality these activities revolved not only around fine ceramics but also, very likely, around amphorae and their contents (wine), which was certainly of high quality and intended for wide circulation.[77] The individuals whose names (both Greek and Oscan) appear on amphorae from Ischia and Naples help to shed some light on the social and economic reality of an area that is still poorly understood. While Rome strengthened its position, once more relying heavily on a partner with extensive commercial capacities (as it had done before with Caere to the north), Neapolis, thanks to its new alliance and the contributions of Ischia, acquired a higher standard of living, and expanded. Ultimately, the production and circulation of wine from the Gulf of Naples in the period following Rome's entrance onto the scene was the outcome of a combination of pre-existing local conditions and prevailing economic synergy.[78]

Neapolis received compensation for its *eximia fides*, benefiting from the routes that had been opened up on behalf of the Roman armies by its merchants and navy. Rome deftly took advantage of the economic and manufactur-

73 Lepore (1952).

74 Frederiksen (1984, 225).

75 De Caro and Giampaola (2004); De Caro (2005, 658); Giampaola (2009, 41).

76 Lepore (1952, 239 ff.).

77 The amphorae may also have contained other products, as reported by the archaeologists who recovered the amphorae from the Secca di Capistello wreck; these also contained grapes, pistachios, olives, and fibres of unknown origin.

78 See contributions by Breglia (1952a and b), Lepore (1952) and Morel (1986, 348 with bibliography).

ing potential of the area of Neapolis and inserted itself into exchange networks that were already established by Naples. It then absorbed these networks, structuring and organizing them (starting with the mint and coinage), thus complying with the demands of the *negotiatores* who were perhaps already sufficiently influential in order to be able to shift Roman policy.[79]

Following the *Foedus*, maritime trade became a *de facto* monopoly of the Greeks from Neapolis[80] who made up the merchant class, whereby "… friendship with the Romans meant peaceful relations with friendly *poleis* in the Tyrrhenian basin, and the return of traffic, perhaps even industrial production, in a position of privilege and respect towards other Italic and Greek competitors, for example the Tarentini, without the need to share any advantage with them."[81]

What is certain is that a series of clues, renovations in the artisanal quarter of Lacco Ameno, the production of new amphora types (the 'Graeco-Italics'), the introduction or expansion of a system of stamping and a new series of coins, point to a transformation of the economic and social reality in the wake of the Roman appearance onto the scene in the final decades of the 4th and the early 3rd century BC. It should be reiterated, however, that the Romans were entering an already existing network of economic and commercial relations, which was created by the Neapolitans themselves; thus, it is that Neapolitan commerce which needs to be investigated further.

In the following phase, around the mid- and late 3rd century BC, the range of activity increased appreciably. Amphorae from the Gulf of Naples (Types V and V/VI) that were stamped in Greek can be traced as far as the routes that led to the north-west Mediterranean and along the French and Iberian coasts.[82]

The situation changed after the Punic Wars. Vineyards now extended into various areas of Campania and along the Tyrrhenian coast, a phenomenon that testifies to the activities of new workshops that appeared along grape-cultivating areas.

The production of new coinage ceased in Naples,[83] while the activities of new amphora production centres along the Tyrrhenian coast intensified, which

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79 Musti (1988, 535). The author also points out that a commercial offshoot of the Roman policy of expansion into the south only materialized in the late 3rd and particularly the 2nd century BC, with the creation of the *Portoria Venalicium* of Capua and Puteoli in 199 BC being the turning point.

80 Zevi (2004, 819).

81 Lepore (1952, 234), citing *Dionysius of Halicarnassus*, XV 5,2.

82 Olcese (2010, chapter VII).

83 Breglia (1952b, 299).

in some cases supplanted those of the Gulf. Wine and amphorae of Graeco-Italic Type VI, still produced at Neapolis,[84] were now also being turned out by other workshops and distributed over a wider area along the Tyrrhenian coastal strip. This makes it even more difficult to distinguish products of different centres even in the laboratory.

8 Recent Developments in the Immensa Aequora Project

Preliminary studies on amphorae and their stamps from the production site of Santa Restituta on the island of Ischia, and their comparison with material from the site of Neapolis, provide important insights in the organization of production and exchange of Campanian wine in the Gulf of Naples during the later 4th and the 3rd centuries BC. With the industry already well-established and substantial, the Roman presence in the area contributed to a situation of mutual benefit. Whereas Rome had opened up an important territorial and commercial corridor (a gateway to the south and towards the sea) and was able to feed into an already present network of economic relations, Neapolitan producers and merchants were able to increase their market considerably, profiting from available Roman infrastructural networks.

The story is, however, far from complete and the *Immensa Aequora* Project continues the study of Campanian wine production through various initiatives. These comprise three main lines of research. The first concerns the comparative and multidisciplinary study, historical, archaeological, epigraphic and archaeometric, of cargoes from shipwrecks in the Italian Tyrrhenian area (fig. 11.7). A large number of mineralogical analyses on ceramics and amphorae from ship cargoes found in the western Mediterranean (around France and Spain in particular) have been performed in an attempt to identify their areas of production.[85] These datasets, which were previously treated separately, have now been considered together with a focus on their chronology and area of origin in combination with some 'crossed perspectives', an approach which may lead to a great step forwards in the study of Roman economy and commerce.[86]

A second promising new avenue is the documentation of largely unknown ancient wine production sites in the regions of Campania and Sicily, especially

84 Febbraro and Giampaola (2009).

85 D. Asensio (Univ. Barcelona, ROCS, S.C.P.), for the samples of some shipwrecks on the Iberian Peninsula, and L. Long (DRASSM), for the shipwrecks of Southern France, have participated in this project.

86 Olcese (2013).

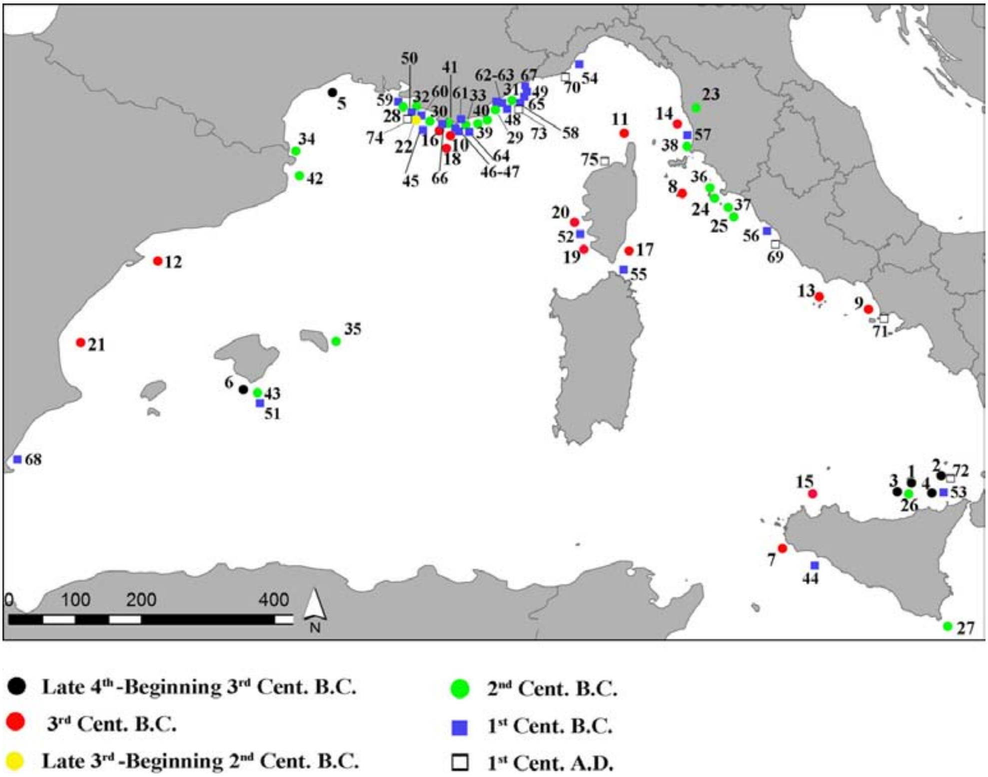

FIGURE 11.7 *Some shipwrecks of Italian origin (end 4th century* BC*–1st century* AD*) in the western Mediterraean (after Olcese (2013, 132)). 1. Filicudi B; 2. Panarea-Roghi; 3. Filicudi F; 4. Secca di Capistello; 5. Tour de Castellas; 6. Cabrera 2; 7. Punta Scario-nave "punica" di Marsala; 8. Montecristo A; 9. Sinuessa A; 10: Tour Fondue; 11: Tour d'Agnello; 12: Amettla de Mar; 13: Ponza A; 14: Meloria A; 15: Terrasini B; 16: Giens A; 17: Cala Rossa; 18: Pointe Lequin 2; 19: Bruzzi; 20: Sanguinaires A; 21: Bon Capó; 22: Grand Congloué 1; 23: Pisa-San Rossore; 24: Punta Lazzaretto A; 25: Cala Scirocco; 26: Filicudi A; 27: Porto Palo di Capo Passero; 28: Riou 1; 29: Baia di Briande; 30: Ciotat 1; 31: Chrétienne C; 32: Mont Rose; 33: Héliopolis 2; 34: Portaló; 35: Lazareto; 36: Punta Lazzaretto B; 37: Punta Scaletta; 38: Baratti B-Pozzino; 39: Ponte du Brouil; 40: Cap Bénat 4; 41: Grand Ribaud A; 42: Illa Pedrosa; 43: Colonia di S. Jordi E; 44: Porto Palo di Menfi; 45: Ciotat 3; 46: Cap de l'Esterél; 47: Cap Bénat 2; 48: Dramont C; 49: Cap Gros A; 50: Planier 1; 51: Colonia di S. Jordi A; 52: Pointe Cacalu; 53: Vulcano-Punta Luccia; 54: Albenga; 55: Spargi; 56: Santa Marinelle-Santa Severa; 57: Perelli A; 58: Chrétienne A; 59: Riou 3; 60: Grand Congloué 2; 61: Baia di Cavalière; 62: Dramont A; 63: Dramont D; 64: Madrague de Giens; 65: Tradelière; 66: Grand Ribaud D; 67: Fourmigue C; 68: Punta de Algas; 69: Ladispoli A; 70: Diano Marina; 71: Bacoli A; 72: Panarea-Alberti; 73: Garoupe A; 74: Petit Congloué; 75: Île Rousse*

focusing on rock-cut wine production sites (*palmenti*).[87] Assessing the relationships between these wine production facilities and nearby ceramic production sites will be of particular interest in the period between the 5th/4th century BC and the Roman era.

Finally, an innovative aspect of the project concerns the application of DNA analysis and gas chromatography to remains of the amphora contents. Preliminary research suggests that ancient DNA of the original contents can be recovered from amphorae retrieved from shipwrecks. However, no systematic studies have been conducted yet in which state-of-the-art high-throughput DNA-sequencing techniques were applied to a fairly large number of samples.[88] A pilot study to investigate DNA in soil and clay materials of a set of samples of Roman amphorae is still ongoing, involving the adaptation of analytical protocols and next-generation sequencing technology already developed and routinely used. Gas chromatography was used to analyse the contents of a number of van der Mersch's type-IV and V amphorae, recovered from the cargos of the Filicudi F (300–280/250 BC) and Secca di Capistello (300–280 BC) wrecks. In order to determine the original content and the nature of the traded foodstuffs, two series of chemical analyses have been conducted, the first one dealing with the sediment directly taken from the amphorae, and the second one using sherds of the fragmented walls of the amphorae even if no visible residue was present on the interior. Implementing the innovative two-step protocol allowed the identification of pitch obtained from *Pinaceae* wood used for waterproofing of the vases, and wine, especially red wine for four of them.[89]

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87 Olcese et al. (2017).

88 Foley et al. (2012).

89 The results of this study were presented by N. Garnier (LNG) and the author at the Congreso Roman Amphorae Contents International Interactive Conference 2015 in Cadiz (Garnier and Olcese (in press)).

CHAPTER 12

Rural, Urban and Suburban Communities and Their Economic Interconnectivity in Coastal North Etruria (2nd Century BC–2nd Century AD)

*Marinella Pasquinucci and Simonetta Menchelli**

1 Introduction

In coastal north Etruria (Luni, Lucca, Pisa, Volterra and their territories; Fig. 12.1) the authors of this chapter are currently conducting an intensive 'total archaeology' research project[1] into long-term developments from the Late Bronze Age to the early medieval period, with a focus on the late Etruscan, early/middle Roman and late Roman periods.[2] The work is still in progress; this chapter presents some results, a few tesserae of a larger mosaic. In particular, it zooms in on the Pisa-Volterra district and on the impact of the Roman conquest on regional economic developments from the 3rd century BC onwards. More precisely, it attempts to establish the nature, the socio-economic effects and the dynamics of cultural change of this process in its urban and wider territorial context, presenting the processed data in chronological order.

From the 6th to the early 2nd century BC two cities, Pisa (Pisae) and Volterra (Velathri, Volaterrae) dominated north-west Etruria. Their territories extended along the coast from the river Magra to the river Fine and from the Fine to Bolgheri respectively and both also encompassed large sections of the hinterland. The conflict with Rome entered a crucial phase in 298 BC when the Volaterrani and the Falisci were defeated near Volterra.[3] In 283 BC Rome definitively overcame the Etruscan peoples near Lake Vadimone. Shortly afterwards Volterra presumably signed a treaty (*foedus*) with Rome. Around the same time Pisa became a *civitas foederata*; in the 2nd century BC, during the wars against the Ligures,[4] it was a Roman military base. In 252/241 BC the coastal road Aure-

* While the authors jointly discussed the paper's contents, sections 1–3 were written by Marinella Pasquinucci and 4–6 by Simonetta Menchelli.

1 Darvill (2001, 36).

2 See Pasquinucci and Menchelli (1999 and 2012).

3 Livy, 10.12.

4 Segenni (2011).

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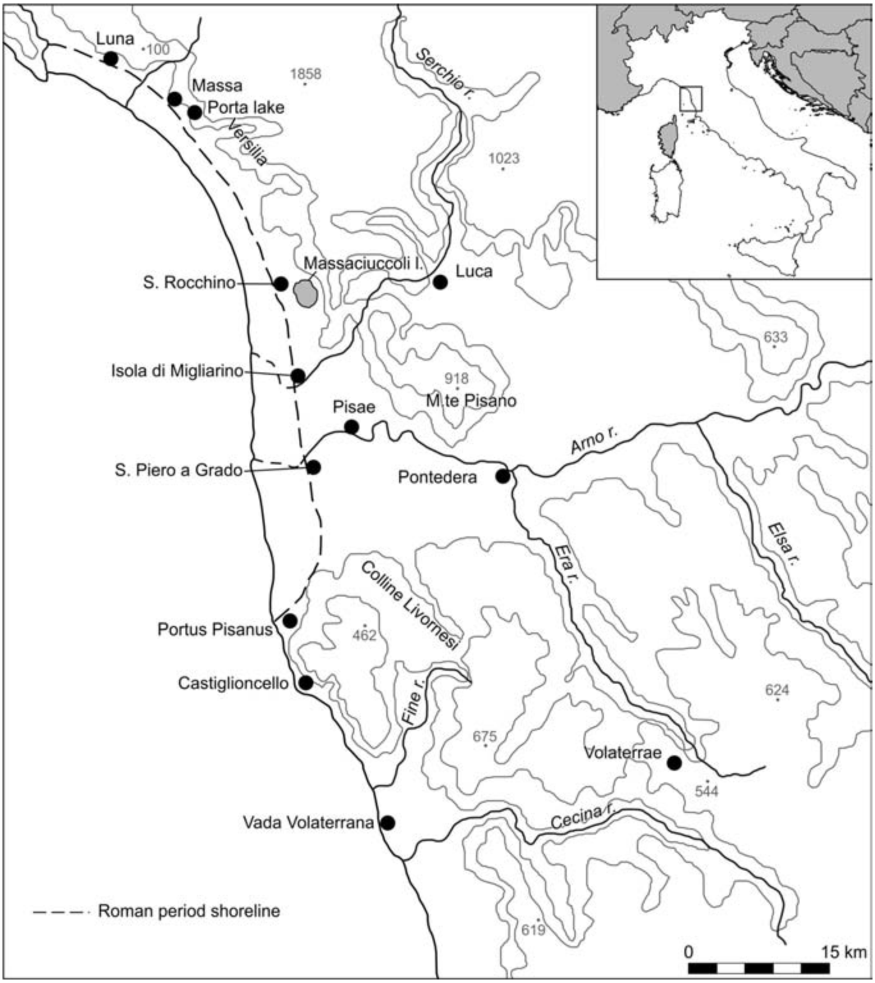

FIGURE 12.1 *The study area*

lia Vetus was constructed, initially linking Rome with Cosa and subsequently extended northward in stages.[5]

With the foundation of two new towns in the context of the Ligurian wars in the 2nd century BC the urban system of north-west Etruria changed. In 180 BC Pisa handed over part of its northern territory for the foundation of the Latin colony of Luca (Lucca), and in 177 BC, after the final defeat of the Ligures in north-west Tuscany, the Roman colony of Luna (Luni) was estab-

5 Coarelli (1988); Ceccarelli Lemut and Pasquinucci(1991).

lished.[6] Between 42 BC (the Battle of Philippi) and 31 BC (the Battle of Actium) or slightly later, most cities and plains in north Etruria were remodelled in the course of resettlement projects for Roman veterans.[7]

The late-Republican colonization of the area had a great impact on the coastal environment. From the 2nd–1st century BC up to c. AD 1830 the coastline progressed westwards, mostly in tandem with the Arno delta, due to a marked increase in alluvial sedimentation caused by anthropogenic factors (deforestation, increased agricultural and manufacturing activities). These factors were linked to the establishment and subsequent territorial remodelling (centuriation, allotments) of Republican colonies in the early 2nd century BC (Luca/Lucca and Luna/Luni) and Triumviral/Augustan colonies in the late 1st century BC (Luni, Lucca, Pisa, Volterra, Firenze, Arezzo).[8]

2 The Roman Conquest and Infrastructural Organization

Pisae is well known to have played a fundamental strategic role in the late 3rd century BC in the wars against the Ligures, both as *civitas foederata* and as the main Roman naval base. During the military actions in 203 BC, when the consular *provincia* 'Etruria ac Ligures' was established,[9] Pisae again served as the main base.[10] In the same period Volaterrae was an ally of Rome and supplied Publius Scipio with '*interamenta navium et frumentum*'.[11] In short, the Romanization process[12] was well underway in this district.

In these years the coasts of north Etruria were a national frontier and therefore, in the words of Hopkins, 'a tax consuming region'. The Roman state sent food and financial support to the border areas to supply the army and to build the infrastructural network (roads, bridges, ports, waterways) necessary for effective control.[13] The organization of the Pisa-Volterra road and port system is well documented by archaeological, literary and epigraphic sources. The main roads were the Via Aurelia Vetus/Nova and the Via Aemilia (named after

6 Coarelli (1988); Ciampoltrini (2004a).

7 Ciampoltrini (1981); Keppie (1983).

8 Pasquinucci et al. (2001).

9 Livy, 30.1.2.

10 Segenni (2011). For the military campaigns see Ciampoltrini (2004a, 306–307).

11 Livy, 28.45.15.

12 A large volume of publications exists on this topic. The most recent works include Revell (2009); Morley (2010); Mattingly (2011); Millett (2012).

13 Hopkins (1980, 101–125). For the needs of war, see also Erdkamp (2007, 101–108).

the most prominent Roman *gentes* involved in the Romanization of Etruria), built in the period 252–109 BC (Fig. 12.2).[14] The modern SS1 (Aurelia) roughly corresponds to the ancient road, which ran along the coast, linking the main harbours (Vada Volaterrana, Portus Pisanus and Luna) and the minor ports that were often located near river mouths. In the route Vada Volaterrana-Pisae, the Via Aemilia followed the foothills in the Tora river valley, a rural area with villas and farmsteads. Its route was marked by a large *mansio* (Torretta Vecchia) and a few milestones. Numerous tombs and necropolises have been identified along these roads, dating back to late antiquity.[15] The Via Quinctia was another important road built in the 2nd century BC; it linked the interior of Etruria with Pisae and its ports, running along the left bank of the ancient course of the Arno.[16] Likewise, an efficient port system became established. In the 3rd–2nd century BC Portus Pisanus and other ports (Isola di Migliarino, S. Piero a Grado, Castiglioncello, Vada) increased their import and redistribution activities,[17] and after the defeat of the *Ligures Apuani*, Luna was founded on a strategic harbour site.[18]

Based on the available evidence, it is difficult to establish whether roads and ports stimulated growth and the integration of communities or rather the reverse: that their appearance is a reflection of these processes.[19] In our study area, at least, all processes appear to have been at work simultaneously.

In the next section a tentative explanation will be offered for the transformation of the district after it entered the Roman global economic system, involving a dense fabric of developments in agricultural and industrial production, infrastructure and the conglomeration of regional markets.[20]

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14 See Note 5. Fabiani (2006) effectively summarises the extensive bibliography on these two roads. On the Aemili, see Rossignani (1995); on the Aurelii/Valerii, see Dallai et al. (2006).

15 See Note 5 and Pasquinucci and Menchelli (2012).

16 Ceccarelli Lemut and Pasquinucci (1991); Mosca (1992); Pasquinucci (2014).

17 Pasquinucci and Menchelli (2010). For the urban port identified in the Pisa-San Rossore area, see Camilli et al. (2006).

18 De Marinis and Spadea (2004).

19 See Witcher (this volume) and De Haas (this volume).

20 Moreover, Woods' 'Global countryside model' as presented by Witcher (this volume) is particularly useful for our narrative as it deals with many topics discussed in our paper, "highlighting the interaction of local and global actors, and of human and non-human actors to produce new hybrid forms and relations" (Woods (2007, 485)).

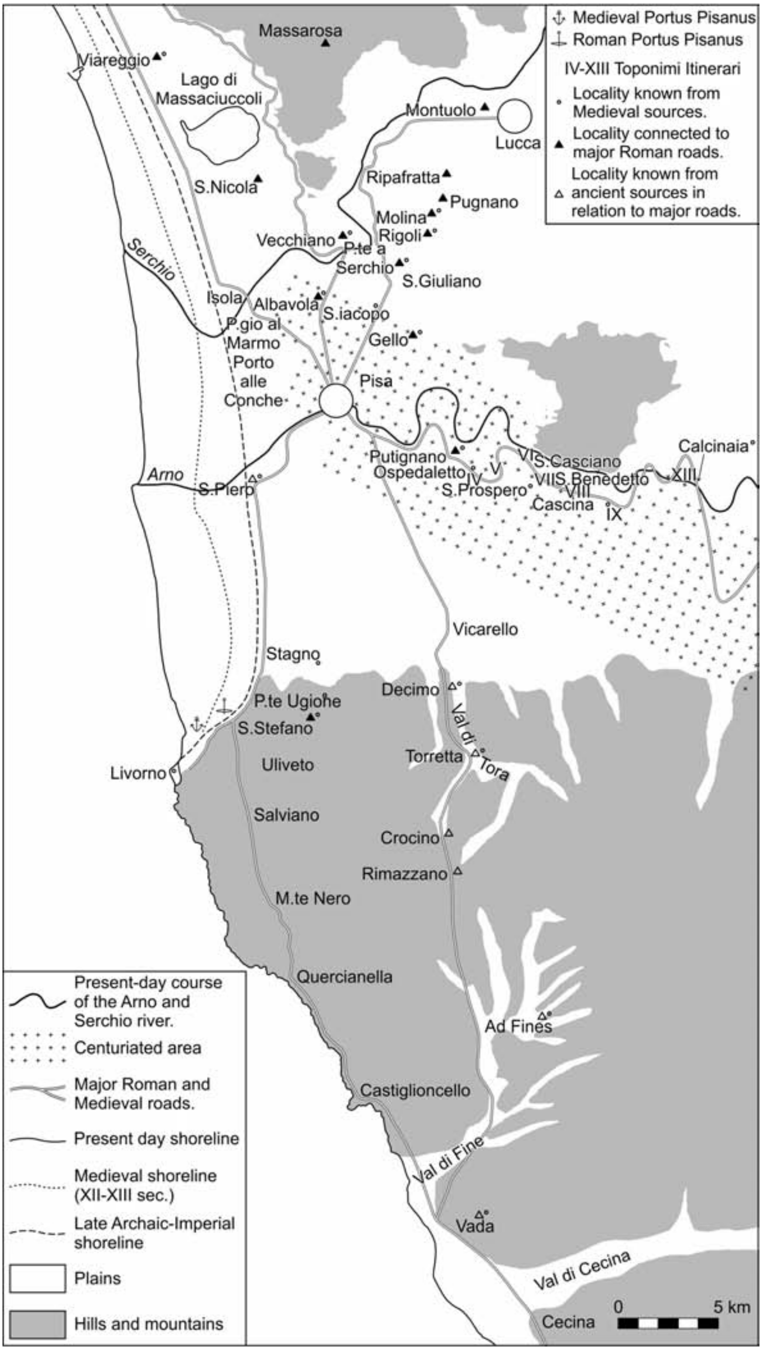

FIGURE 12.2 *The main Roman roads in the study area (after Ceccarelli Lemut and Pasquinucci (1991))*

3 Economic Development in the 3rd to 2nd Century BC

In the 3rd–2nd century BC Pisae, Volaterrae and their respective territories appear to have been flourishing. This prosperity was based on agriculture (as will be argued below, cereals and grapes were the main crops), cattle breeding,[21] and commercial and industrial enterprises including shipyards,[22] stone quarries,[23] and workplaces for ceramic, stone and alabaster items. Volaterrae in particular, whose aristocracy enjoyed a privileged relationship with Rome,[24] boasted a thriving artisanal production that included cinerary urns[25] and black gloss ware, which enjoyed remarkable commercial success.[26] Although to date no kilns for the production of black gloss ware have been identified, many scholars believe that the main workshops were located in the urban/suburban areas of the town,[27] while in the 2nd century BC black gloss ware was also produced in the countryside (Montaione; see below). This is a significant example of the integration of urban/suburban and rural economies in one manufacturing process.

In many Italian towns urban black gloss ware kilns were located in peripheral/suburban areas, close to the city walls and gates, in order to limit both the risk and the inconvenience of smoke and fire, and to facilitate the supply of raw materials.[28] That is probably where also the Volterra workshops were to be found, as is documented for medieval and renaissance pottery kilns,[29] which clustered on the slopes above the Cecina valley.[30]

As usual in Roman pottery production, the process involved an elite who owned the land, sources of raw materials (clay, water, firewood), facilities (workshops, drying sheds, kilns), and craftspersons with the necessary skills to

21 Livy, 35.3 (on the *ager Pisanus*): *vis magna pecorum*. Moreover, loom weights are scattered throughout the rural settlements.

22 Strabo, 5.2.5 writing about Pisae and drawing on Posidonius (Lasserre (1967, 202)).

23 The hill/mountain areas (Monti Pisani, Monti Livornesi) supplied building stone. In his description of Pisae Strabo (5.2.5), once again drawing on Posidonius, mentions the quarries at Monte Pisano. The same stone was later used for part of the medieval city walls.

24 Castiglioni and Pizzigati (1997, 28).

25 Maggiani (1985); Nielsen (1988).

26 Cibecchini and Principal (2004); Cibecchini (2011).

27 Di Giuseppe (2012) summarized the debate on the topic.

28 Di Giuseppe (2012, 80).

29 Pasquinelli (1987).

30 Menchelli et al. (2013). On this topic, see also Peña (2013b and this volume).

work clay, to model and decorate the vessels, and to control the firing process. The absence of stamps on Volterra black gloss ware is significant. The lack of stamps can be explained by assuming a 'centralized' model of production by the city or by a few members of the aristocracy. This 'monopolistic system' obviated the need for stamps to mark individual products.[31]

Regarding rural black gloss ware there is archaeological and archaeometric evidence of a Volterra lower-quality pottery, which supplied the local market.[32] Most likely it was produced in small kilns scattered throughout the Volterra territory from the coastal plain to the interior, but so far the only production site discovered is the one near Montaione, in the valley of the river Egola.[33] Here, a production centre with at least three small kilns has been identified. It is not clear whether this was an isolated rural site or whether it belonged to a nearby settlement that yet remains to be identified. In north Etruria similar situations have been documented at various sites in the territory of Clusium,[34] particularly at Marcianella where a large rural pottery production centre was excavated that was probably linked to the town of Clusium.[35]

Returning to the urban black gloss ware, H. di Giuseppe[36] demonstrated that the Volterra manufacturing tradition displayed a high degree of continuity, since "the Etruscan type of the Campana-B circle"[37] derived from the relatively high quality Volterrana D.[38] This north-Etruscan production passed through the Romanization process whilst maintaining its own identity; in fact, the Romans traded the local black gloss ware within their own economic networks, especially to the northwest[39] when conquering the Gallic and Iberian coasts.

In addition, the demands of the Roman economy had a considerable impact on north-Etruscan agriculture, in particular the production of wine and the trade in food items. The authors believe that the Graeco-Italic and Dressel 1 amphorae especially represent clear illustrations of a number of social and

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31 For the opposite model, one based on a nucleated system, which required the use of stamps, see Fülle (1997). See Notes 82–94 for the production of terra sigillata.

32 Pasquinucci et al. (1998); Menchelli, Pasquinucci and Picchi (2013).

33 Bartali and Ugolini (2007).

34 Paolucci (2003, 11–14).

35 It consisted of six kilns, active between the 3rd and 2nd centuries BC and produced black gloss ware, red slip ware, thin-walled pottery, coarse wares, amphorae and loom weights (Pucci and Mascione (2003)).

36 Di Giuseppe (2012, 138).

37 Cibecchini and Principal (2004, 162).

38 Pasquinucci (1972).

39 Bianchini et al. (2000, 10); Cibecchini (2011).

economic phenomena. In the early stages of the Roman conquest, a large number of Latial-Campanian amphorae reached the north-Etruscan coast.[40] Reflecting a truly global economy, these amphorae not only arrived at the consumption centres of the allied communities but also in the Ligurian oppida in the Pisa-Versilia territory, in the middle of the Romano-Ligurian wars. Graeco-Italic wine amphorae have been found at a number of high-altitude settlements on the Alpi Apuane (Monte Piglione: 1,233 m asl; Monte Piglionico: 1,200 m asl)[41] in association with black gloss ware drinking cups and jugs manufactured in central-Tyrrhenian areas.[42] Evidently the Ligures, while facing their long, valiant struggle against the Romans, were still drinking their enemies' wines and using their vessels (especially *petites estampilles* cups). This import on a massive scale, well documented throughout the Pisa-Volterra territory and in ports, urban settings and rural contexts,[43] bears witness both to an increased local demand for wine and to the participation of this district in the Roman trade, which sent enormous quantities of wine and black gloss ware vessels towards the western Mediterranean.[44]

This is the historical context in which the Roman conquest stimulated the north-Etruscan Graeco-Italic production as early as the mid-3rd century BC. The region appears to have been suitable for grape cultivation from the proto-historical period onwards, as palaeobotanical[45] and archaeological data indicate.[46] Relevant with regard to subsequent periods is the observation that archaeological[47] and archaeometric evidence[48] suggests that Etruscan PY3 and PY4 wine amphorae were produced locally. Clearly the increased demand for wine stimulated by the Romanization process tied in with the district's agricultural potential.

Regarding the location of the workshops it can be stated that while black gloss ware production was both urban (Volaterrae) and rural (Volaterrae and Pisae territories), that of the Graeco-Italic and Dressel 1 amphorae centred on the ports. Artisanal quarters have been identified in the hinterland of the ports

40 Menchelli et al. (2007).

41 Guidi et al. (1987).

42 Paribeni ed. (1990); Ciampoltrini (2004b).

43 Menchelli et al. (2007); Camilli et al. (2006).

44 Generally, Tchernia (1986) remains of fundamental importance on this subject; see also Cibecchini (2011). For the export of local products see Menchelli et al. (2007; 2013).

45 Guido et al. (2004, 85).

46 Zanini (1997, 103–115).

47 Corretti (2003, 359).

48 Menchelli et al. (2007).

Vada Volaterrana[49] and Portus Pisanus,[50] as well as in the *ager Lunensis*, in a coastal site today occupied by the town of Massa.[51] This location near ports was due to the specific demands of production (Fig. 12.3); it was more convenient for amphora kilns to be situated in the rural hinterland of ports. It is likely that the same land owners, or at least the same *gentes*, controlled the main workshops of both amphorae and black gloss ware, but data on their organization is lacking since these were not stamped. Data on the scale of production is also still insufficient, but it is certain that north-Etruscan black gloss ware and amphorae were both traded throughout the western Mediterranean.[52]

4 Late 2nd–1st Centuries BC

The Roman economic strategy is evident mainly in the standardization of amphora shapes and in technical details of the kilns as has been documented at the Cà lo Spelli (*ager Pisanus*) and Massa production centres. Careful excavation revealed that identical kilns had been used,[53] turning out similar amphorae. The same standardization has been observed at other amphora workshops, in areas which entered the Roman economic sphere.[54] This transmission of expertise and technology[55] is clear evidence of the interaction of local and global agencies, which in turn successfully stimulated integration.

While it is possible to present an overall reconstruction of local manufacturing trends, an assessment of land management issues in the Pisa-Volterra countryside[56] is problematic. As was stated above, the district was characterized by a mixed farming economy (it still is today), which included cereal cultivation and commercial crops (vineyards, olive trees). Rural settlement patterns based on field survey results did not reveal signs of a demographic crisis in the countryside. On the contrary, in the 2nd–1st century BC small production units

49 Cherubini et al. (2006).

50 Cherubini et al. (2006); Picchi et al. (2010).

51 Fabiani (2012).

52 For black gloss ware, see the references in Notes 48–51. Integrated archaeometric studies indicate that local wine amphorae were traded to Gallia (Thierrin-Michael et al. (2004)).

53 They have vault elements of identical type (conical) and dimensions (c. 21 cm long); see Menchelli et al. (2013, fig. 5, 6–7).

54 E.g. the Sella Marina kilns in *Bruttium* (Corrado (2009, Fig. 3)).

55 Van Oyen (2011) recently discussed the encounter of different pottery production systems and their associated expertise.

56 On the central position of agriculture in the ancient economy, see Mattingly and Salmon (2001b, 3–5).

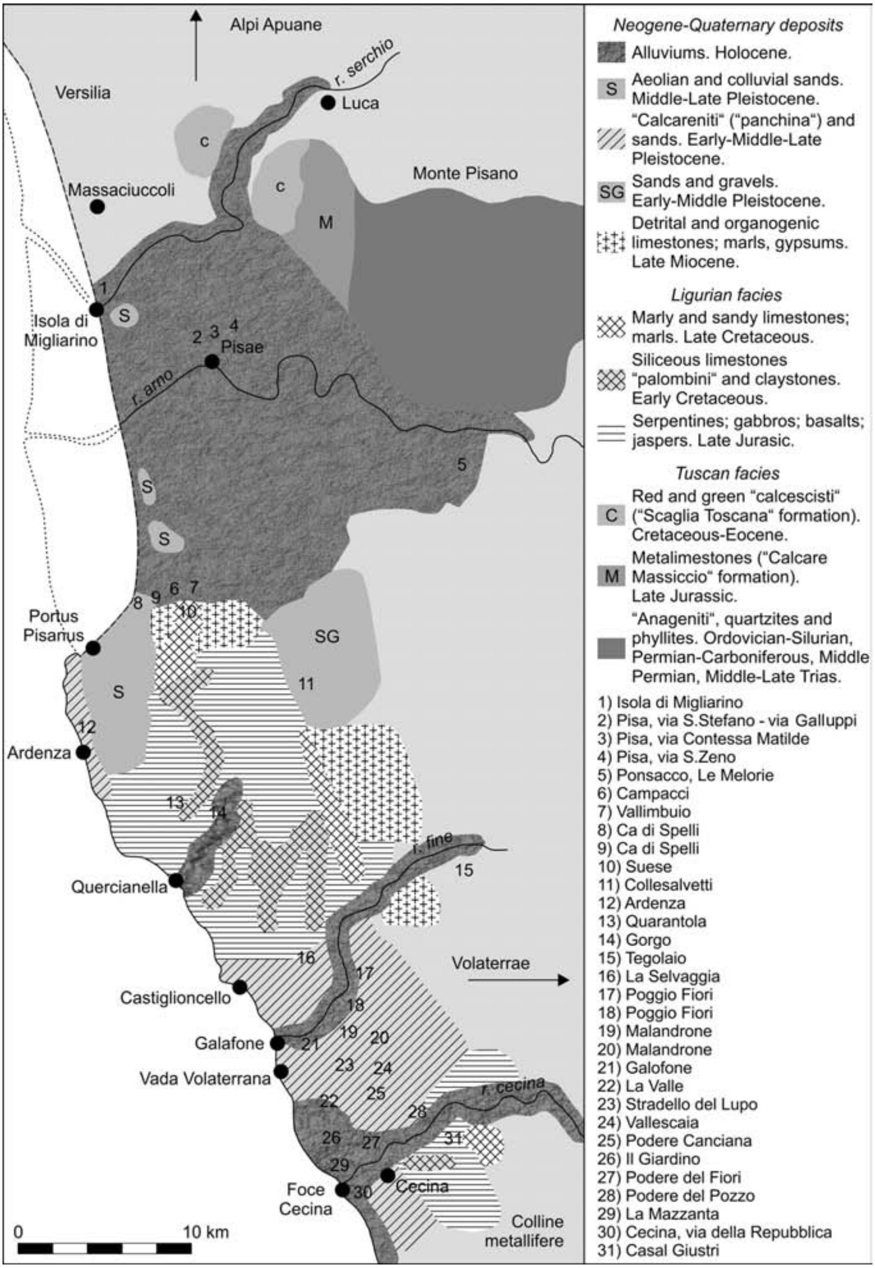

FIGURE 12.3 *Schematic geological map showing the location of the north-Etruscan workshops. The production sites of sigillata and amphorae mentioned in the text are, for terra sigillata: Nos. 1, 2, 4; for Graeco-italic amphorae: Nos. 25, 28; for Dressel 1 amphorae: Nos. 7–9, 14, 28–29; for Dressel 2–4 amphorae: Nos. 6–9, 14, 16–19, 23; 25; 27–30*

TABLE 12.1 *Settlement trends in a sample area surveyed in the coastal* ager Volaterranus (*After Iacopini et al. 2012*)

Typology	Chronology									
	3rd c. BC	**2nd c. BC**	**1st c. BC**	**1st c. AD**	**2nd c. AD**	**3rd c. AD**	**4th c. AD**	**5th c. AD**	**6th–7th c. AD**	**Roman period**
Villas (total 11)		6	7	11	11	11	11	11	2	
Farms (total 66)	9	19	44	54	50	43	40	33	4	
Villas/farms (total 2)				1	1	2	2	2	1	
Kilns/workshops (total 16)			6	13	13	12	7	5	1	3
Mansiones (total 2)	1	1	2	2	2	2	2	2		
Off-site (total 12)				4	4	10	12	10	4	

prevailed (farmsteads) while villas were rare.[57] Only one villa, late Augustan in date, has been recorded in the territory of Pisa (Massaciuccoli). Epigraphic evidence suggests that its owner was probably a member of the *gens* of the Venuleii Aproniani, who were part of the local elite.[58]

In the Volterra coastal plain the authors have identified seven villas, but surveys carried out further inland by Carandini and Terrenato and by the authors produced no evidence for villas there.[59] Survey results in the coastal *ager Volaterranus*, between the rivers Fine and Cecina, suggest an increase in the number of rural settlements from the 2nd century BC and peaking in the 1st century AD (Table 12.1).[60] It seems, therefore, that the elite in the late Republican period and later lived mostly in urban or suburban *domus* at Pisae, Volaterrae or Rome, while their estates were run by farmers, most likely tenants (*conductores* or *coloni*) from whom the land owners would periodically collect rent, produce or sale proceeds.[61] Past research has convincingly demonstrated,[62] and recent and current research have confirmed, that free labour coexisted

57 Pasquinucci and Menchelli (1999).

58 Ciampoltrini (1994).

59 Terrenato and Saggin (1994); Terrenato (1998); Terrenato (2001b).

60 Iacopini et al. (2012). Of course the total number of sites is the combined reflection of phenomena of abandonment, construction and re-occupation, etc. There are many more 'farmstead' sites than villas (respectively 44 and 7 in the 1st century BC).

61 Aubert (1994, 129–131). On this issue, see Launaro (2011a, 23–25 and this volume).

62 Gabba (1979); Capogrossi Colognesi (1992–1993, 202).

in Roman Italy alongside slave labour, and that the small farmer persisted[63] and even structurally benefitted the villa system. Whatever land management strategies may have been used, a large agricultural surplus was certainly produced in the Pisa-Volterra countryside[64] since even small farmsteads participated in market exchange—albeit obviously on a reduced scale—as shown by the imported wares collected at many of them.[65] Presumably there were other important economic enterprises in the district in addition to agriculture and pottery production, in particular shipbuilding[66] and long-distance trade.[67]

In conclusion, the district appears to have experienced a phase of progressive economic growth in the 2nd and 1st century BC.[68] The question is who the protagonists of this process were, which involved the local economy in all its agricultural, manufacturing and trade aspects, and in both urban and rural contexts. Who stimulated the local potential and channelled it into a global economic system? Those protagonists were probably the main Roman *gentes* who were involved in the Romanization process in north Etruria (Aemilii and Aurelii/Valerii), as well as members of the local elite (Ateii,[69] Caecinae,[70] Rasinii[71]) who were able to gain the respect and protection of the former group.

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63 Lo Cascio (2004). On the persistence of the peasant/soldier, see Gabba (1979) and Rosenstein (2004). On the continued vitality of the Roman peasantry, see Kron (2008a) with references.

64 Evidently, these territories took part in the general production trends, which affected Roman agriculture in the late Republican period, as documented by Kron (this volume).

65 Pasquinucci and Menchelli (1999). An increase in the quality and quantity of consumer goods in broad socio-economic strata is generally accepted to be the result of an expanding economy (Harris (2007, 529–533)).

66 According to literary and epigraphic sources, the Pisa shipyards (*navalia*) were active from the Republican (see above, Note 29) to the late Roman period (Claudianus, *Bell. Gild.* 483). *Fabri tignarii* and *fabri navales* are mentioned in an early Imperial inscription (CIL XI, 1436) and '*galeioti*' (galley builders) are referred to in medieval documents (Garzella (2003a and b)).

67 For example, in 46 BC Aulus Caecina was involved in *negotia* in Asia Minor (Cicero, *Epistulae ad Familiares* 6.8.2 and 2.7.5).

68 For scholars who, like the authors, maintain that the Roman economy had a variable, but in some phases perceptible, development, see Lo Cascio (2006); Wilson (2009b). Scheidel (2007b and 2009), however, disputes this claim. The issue was the subject of a conference in Leuven, published in *FACTA* 5 (2011); see in particular Poblome et al. (2011).

69 Sangriso (1998).

70 Pizzigati (1997).

71 Sangriso (2006).

In our opinion, the economic development of the district was rooted in this interconnectivity between Roman and local elite.[72] It is highly likely that they all took advantage of the growth that resulted from the conquest and laid the foundation for the subsequent expansive phase, during which these groups instigated many manufacturing activities, as documented by stamps on bricks, tiles and terra sigillata.

5 The Early Imperial Period

Pisae and shortly afterwards Volaterrae became Roman *coloniae* (respectively *Colonia Opsequens Iulia Pisana*[73] and *Colonia Iulia Augusta Volaterrae*).[74] Their urban plans were improved and embellished with new buildings, canvasses for early Imperial propaganda as documented by archaeological and epigraphic evidence.[75]

The number of settlements in the two towns' respective territories appears to have greatly increased, especially in the Pisa plain, which was subjected to centuriation.[76] Excavations carried out near Acquarella (Camaiore) in the northern *ager Pisanus* partially revealed the remains of a late Republican/early Imperial farmstead with an oil press, which functioned until the late Roman period.[77]

72 This could be labelled a 'landscape of opportunity' according to Mattingly's classification for Roman North Africa (Mattingly (2011)).

73 Segenni (2011).

74 Munzi and Terrenato (1994).

75 Pasquinucci (2003); Segenni (2011) for Pisae; Munzi and Terrenato (2000) for Volaterrae; see in general Terrenato (2001b).

76 Pasquinucci and Menchelli (1999). See Witcher (2006a) for the complex debate on Etruria. The authors excavated two farmstead sites identified by surveys within the centurial grid. However—and methodologically interesting—the sites did not produce any Roman stratified structures or objects, only many residual finds in the top soil, which were consistent with a late Republican and late Roman date. At one of the farmsteads, in the east of the *ager Pisanus* (site Le Melorie, Ponsacco) the authors were able to excavate its bricks and also a roof tile kiln, which was well preserved as it had been dug into a deep, thick alluvial level (Pasquinucci et al. (2008)). All buildings at the second farmstead, in the south of the *ager Pisanus* (site Coltano), had been completely destroyed, but below the destruction levels a Bronze Age salt-production settlement was discovered (Pasquinucci and Menchelli (2002)).

77 Paribeni (2012, 43–52).

Rural settlements, which also arose in the coastal *ager Volaterranus*, included farmsteads and villas (see Table 12.1); the results of the excavation of one of these, a villa at S. Vincenzino, located south of Vada on the left bank of the Cecina River, were recently published.[78] Farmsteads in the Pisa-Volterra district appear to have been prosperous, as demonstrated by the presence of column bricks, window panes, and different types of flooring according to the rooms' specific function (*opus spicatum*, *signinum* or quadrangular paving stones).[79] Most of these farmsteads yielded pottery imported from the entire Mediterranean basin, evidence of their integration into a market-oriented economy. Locally traded surplus undoubtedly consisted mainly of cereals and also wine, as the abundant local production of Dressel 2–4 wine amphorae shows.[80] These products had always characterized the district; significantly, Pliny refers to them in the 1st century AD.[81]

It was no coincidence that the Pisae sigillata production started (c. 15 BC) at the instigation of Marcus Valerius Volusus, a member of the *gens* Valeria who participated in the Romanization of the district.[82] Interestingly, Valerius Volusus sigillata vessels from Pisa are widespread in military and civil contexts; these vessels paved the way for the Ateian sigillata, which became an enormous commercial success a few years later.[83]

The Pisa sigillata workshops were located in the northern suburbs and in the northern part of the *ager Pisanus*. Archaeological, archaeometric and epigraphic evidence has led to the identification of an industrial district, which stretched from the periphery of Pisae to the mouth of the river Auserculus/Serchio near Isola di Migliarino, where there was an important sigillata workshop and a harbour.[84] Of all Italian sigillata production centres, the output at Pisa was quantitatively surpassed only by those producing Arretine wares.[85] The

78 Donati (2012).

79 Pasquinucci and Menchelli (1999).

80 See below and Fig. 12.3.

81 According to Pliny, the territory of Pisae was famous for its *Pariana uva* (Pliny, *Naturalis Historia* 18, 109), *siligo* and *alica* (Pliny, *Naturalis Historia* 18, 86–87; 18, 109).

82 Gliozzo et al. (2004). The stamped sigillata vessels found in the Cinigiano workshop (Vaccaro, this volume), tentatively suggest industrial activities by the Aurelii in south Etruria. However, the stamp in question, published in OCK (2000, No. 422) and also dating to 15 BC, is generic and could in theory derive from various workshops located in a number of geographical areas.

83 Menchelli (2011a).

84 Menchelli et al. (2001).

85 OCK (2000, 37, Table II).

FIGURE 12.4A–B *The Isola di Migliarino Potters' List, as transcribed by Camodeca (2006):*
XII k. Augu(stas) [i.e. 21 July]
Fornax minor one-
ra[ta
Cretici cat(illi) cccl
Nonian[i] cat(illi) dcccl
Saturn[ini] cat(illi) cccxl
Lu+++ui ? par(opsides) ccc
Coniunc.? ace(tabula) cxc
Thiodori ace(tabula) dc>>

distribution of Pisan products throughout the Roman Empire and beyond[86] in military contexts and on free markets[87] symbolises the Roman global economy.

Concerning the Pisan sigillata production, some quantitative data can be derived from the potter's list from Isola di Migliarino published by G. Camodeca (Fig. 12.4a–b).[88] According to this scholar, 2630 vessels were placed in a single load, in the *fornax minor* of Sex. Murrius Festus, whose 'firm' appears to have worked for 90 years (AD 60–150).[89] Assuming that at least twelve kiln loads were fired in a year (two every month from April to September),[90] the minimum number of vessels fired in this smaller kiln would amount to c. 31,000 per year. Multiplying this annual production by the ninety years the company

86 Menchelli (2004; 2011a), with extensive references; Mees (2012).
87 Menchelli (1997); Tchernia (2007, 57–64) pointed out the close connection between private and state-controlled trade.
88 Camodeca (2006).
89 OCK (2000, no. 1212). So far only 306 stamped vessels by this company have been documented in Mediterranean trade contexts.
90 Marichal (1981) in his calculations for the Graufesenque production assumes a maximum of 16 kiln loads a year.

was active results in an estimated total figure of c. 3,000,000 vessels. This number is hypothetical, since it is not certain that the kiln maintained the same production rate throughout these years. Bearing in mind, however, that it was only a smaller kiln owned by one of fifty-two sigillata potters[91] working in Pisa and its territory for over a century, it is a good indication of the vast scale of the district's production.[92]

In the light of this massive volume and widespread production of sigillata, the interconnectivity of rural/suburban and urban economies in the district is evident. Sigillata workshops could be found both in the Pisa *suburbium* and in the north of the *ager Pisanus*, and the profits they raised must have benefitted the economy of Pisa, where most of the owners and managers probably lived. Their names were stamped on the vessels; the most famous 'firms' were owned by *gentes* (Ateii, Rasinii, Murrii, Nonii, etc.) who belonged to the local elite.[93] They connected the rural, suburban and urban contexts by exploiting the agricultural potential and the natural resources (wood and water, and obviously clay for kilns), but also by sharing the same unskilled labour force. The vast number of workers employed in the sigillata production could also be deployed in other agricultural, commercial or manufacturing enterprises according to seasonal demand.[94]

The local production of Dressel 2–4 amphorae illustrates the close integration of agricultural and ceramic production. A number of manufacturing centres in the hinterland of Portus Pisanus and Vada Volaterrana catered to the Pisa and Volterra farmsteads and villas that produced a wine surplus. These amphorae supplied the local market and were also traded westwards, but since they were rarely stamped and can therefore not easily be identified, the available data probably underestimate the extent and importance of their circulation.[95] The same production areas also turned out bricks and tiles stamped by

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91 Their stamps are reordered in OCK. (2000). This publication mentions another 46 sigillata potters who presumably also worked in the Pisa district.

92 Vernhet (1994) presented comparable calculations for the Gallic sigillata produced at La Graufesenque: an annual minimum of 15 million vessels which, multiplied by the 40 years of manufacturing activities, results in a minimum of 600 million vessels.

93 Menchelli et al. (2001). On the multi-faceted organization of Italian (and specifically those at Pisa) sigillata workshops, see Fülle (1997); Kenrick (2004).

94 On this topic, see Jacob and Leredde (1982). In the early Imperial period a master could redeploy his human property to other activities, as is documented by many legal sources (Bodel (2011, 230 Note 30)). Seasonal immigration, also long-distance, is documented by literary sources; see e.g. the case of Vespasian's great-grandfather (Suetonius, *Vesp*. 1.4).

95 Menchelli et al. (2007). They were traded to the territories of the Helvetii and Rauraci; see

members of the Pisa-Volterra aristocracy, often the same *gentes* as those who were involved in the production of terra sigillata. These bricks and tiles were used locally in villas and in sponsored public building projects,[96] but they also circulated in the north-Tyrrhenian commercial networks.[97]

If terra sigillata and stamps on bricks and tiles yield information on the names of workshop owners who belonged to the north-Etruscan ruling class (Valerii, Ateii, Rasinii, Venuleii, Caecinae, Nonii, and so on), only sparse data are available for the Dressel 2–4 amphora production.[98] A few large villas near the Dressel 2–4 amphora workshops in the hinterland of Vada Volaterrana hint at a close connection between the agricultural and manufacturing interests of the local ruling class.[99] A number of necropolises that have been identified in this manufacturing district[100] mainly contained poor graves and are a potential source of information on the settlement system. This system consisted of *casae* and *tuguria* scattered throughout the countryside or, more likely, concentrated in small agglomerations near the kilns.

The impression is that from the Augustan period to the early 2nd century AD the local urban/suburban and rural contexts were united in a single economic network, which included agricultural, manufacturing and commercial enterprises.

6 Conclusions

Based on the data presented in this chapter the authors believe that this coastal district witnessed intensive economic growth in the late 1st century BC to the 1st century AD, a so-called Smithian growth, to use a term often used by modern economic historians.[101] The Pisa sigillata is the most convincing evidence for

Thierrin-Michael et al. (2004); Martin-Kilcher et al. (2013, 393). See Genovesi (2012, 550–558) for the stamp FELIX.

96 See above, Notes 70 and 58 on the Caecinae and the Venulei Aproniani respectively.

97 Menchelli (2003); Gliozzo et al. (2004); Dallai et al. (2006).

98 See Note 95.

99 Cherubini et al. (2006). One of these villas has recently been the subject of a detailed publication (Donati (2012)).

100 Costantini (2012, 80–87).

101 The term ‘Smithian growth’ particularly refers to an intensive development in pre-industrial societies characterized by an increase in population and average income, expansion of agricultural and manufacturing production, and integration of regional markets. Such growth is not based on technological innovation but on the division of labour and on spe-

this growth as millions of vessels were produced for over a century and traded to every geographical, economic and social context in the Romanized world. This production boom was the result of a number of favourable factors:

1. A general economic development including demographic growth, which stimulated non-food producing activities. Agriculturally generated income could thus sustain manufacturing activities;
2. The availability of raw materials (clay, fuel, water), making the large-scale production of sigillata highly lucrative;
3. Local land-owning *gentes*, who were interested in investing in production facilities (kilns and workshop equipment) and services (raw-material supply, a skilled work force);
4. Flexibility in the division of labour. Slaves, freedmen, free workers and tenants could all take part in the same production processes in the sigillata workshops or in agriculture,[102] activities that were highly seasonal and encompassed a range of tasks, demanding varying degrees of specialization;
5. An efficient infrastructural network of ports, road and river systems;
6. Guaranteed open markets, both military and civilian, as a result of the Augustan expansionist policies.

To summarise, the production system of the north-Etruscan districts was characterized by a high level of interconnectivity in many of its aspects:

1. Successful interaction between global (Rome, its army and trade) and local economies, the latter encompassing communities, which exploited the area's natural potential and artisanal traditions;
2. A high degree of interconnectivity between the main towns, their ports and the scattered settlements in the countryside. All were components of the same productive, redistributive and consumption processes, thus transcending their prefixed roles; Pisae and Volaterrae were also centres of specialized manufacturing for export,[103] while small farmsteads were also centres of consumption;

cialization. See e.g. Jones (2000, especially xxii–xxiv). On growth in the ancient economy, see the literature mentioned in Note 69.

102 See above, and the literature mentioned in Note 94.

103 On the debate on towns being production areas as well as centres of consumption, see Parkins (1997); Erdkamp (2001); Santoro (2006).

3. A close relation between manufacturing activities and the rural context not only in agricultural production (the link between wine and amphorae is obvious), but also in the exploitation of natural resources (water, clay, wood);
4. Social interconnectivity in economic production. On the one hand, members of the elite could own villas, ceramic workshops and other enterprises. On the other, low-level workers could be deployed in various activities, depending on the demands of the season and the production process. Partially due to this interconnectivity from the late 1st century BC to the 1st century AD, north-Etruscan society was characterized by a high degree of economic and social mobility, which cut across social classes; many slaves became *servi officinatores* in the *figlinae*,[104] many freedmen reached the status of *Augustales*,[105] and a few of the *gentes* entered the Senate.[106]
5. The boom-and-bust phenomenon does not seem to have led to a crisis as is documented in other Italian districts;[107] even the end of the Pisa sigillata production does not appear to have caused a dramatic breakdown of the local economy.

In conclusion, this district, with all its distinctiveness, was transformed upon entering the Roman globalizing economy and presumably consisted of interdependent markets,[108] despite its imbalances, asymmetries and uncertainties.[109]

The authors believe that their bottom-up approach has provided some evidence of this economic integration. In particular the multi-scale perspective (micro-region, Italy, the Romanized world, and beyond) has been useful in

104 As documented by stamps on Pisan terra sigillata (Fülle (1997, 111–155)) and north Etruscan brick and tiles (Menchelli (2003)).

105 Ciampoltrini (1982); Fabiani (2002).

106 See Capdeville (1997); Pizzigati (1997); Segenni (2011).

107 Witcher (this volume), commenting on Woods (2007).

108 Taking into consideration the extensive evidence presented by Temin (2001, 169–181), we think that the 2nd century BC–1st century AD Roman economy was primarily a market economy. Even though some geographical areas and social groups could be excluded from it the economic connections documented between distant parts of the Empire confirm the existence of interdependent markets. Cf. also Greene (2006) for the overcoming of the dichotomy between the primitivistic and modernistic models; see also Mattingly and Salmon (2001b, 11).

109 Gabba (1988). For example according to Morris et al. (2007) we should distinguish between the ancient and modern economies; see the general criticism of Bang (2006). Concerning market integration cf. also Erdkamp (2005, 204–205).

reconstructing the local economy in its complexity, while dissolving a few dichotomies on the way (rural/urban, rural/manufacturing, domestic/market-oriented, local/global, and so on). Obviously, regional variability has to be taken into account; many different situations can be expected to have existed in Italy due to combinations of local and global factors. In order to assemble the puzzle of all the different cases within this larger framework, it is our task to integrate reliable micro-regional datasets into a general network, starting from the local facts and up to Mediterranean-wide connectivity.[110]

110 Horden and Purcell (2000).

CHAPTER 13

The Role of Overseas Export and Local Consumption Demand in the Development of Viticulture in Central-Adriatic Italy (200 BC–AD 150). The Case of the Ager Potentinus and the Wider Potenza Valley

Dimitri Van Limbergen, Patrick Monsieur and Frank Vermeulen

1 Introduction

The history of Italy's wine industry between the end of the Second Punic War (218–201 BC) and the High Imperial period (late 1st–2nd century AD) has long been described in terms of a boom-and-bust cycle, driven mainly by overseas exports and provincial import replacement.[1] In a now classic narrative, Rome's progressive conquest of the Mediterranean in the Late Republican period (200–30 BC) generated enormous markets in both East and West that consisted not only of Roman colonists and military men on campaign, but also of local elites, keen to emulate the new fashions, habits and status symbols introduced in their regions by Italian merchants and businessmen. This very favourable conjuncture offered financially robust farmers and other entrepreneurial individuals in central Italy the opportunity to specialize in the production of highly profitable 'cash crops' such as grapes (and olives), and thus to intensify their cultivation through the introduction of a comprehensive system of more systematic land management. Viticulture in particular was in that context a highly remunera-

1 Studies on the development of Italian viticulture in the Late Republican and Early Imperial period have traditionally focused on the well-known central-Tyrrhenian transport containers, embodied by the types Graeco-Italic, Dressel 1, and Dressel 2–4 (Tchernia (1986, 42–53); Hesnard et al. (1989); Maza (1998)). On the other hand, the role of the central-Adriatic amphorae has long been neglected. For instance, the Lamboglia 2—now seen as one of the most representative of the central-Adriatic wine amphorae—was long considered to be an oil container from Apulia (Tchernia (1986, 53–56 and 68–74)). In recent years, however, our knowledge has much improved, and it is now clear that they, too, are an important group of transport containers, reflecting a major wine trade which existed along the eastern coast of the Italian peninsula (Panella (2010, 17–21, 90–94, with cited bibliography)) (see *infra*).

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tive activity which—by intensive exploitation of good agricultural land and by means of massive investments—could generate substantial surpluses of which a part could be shipped to external markets; a process for which the widespread occurrence of central-Italian amphorae across the Empire is ample evidence.[2] When, from the Augustan period onwards, some of the provincial markets began to produce the wine (and oil) they had previously imported, a gradual decrease of Italian transmarine exports occurred. At the same time, ceramic assemblages, especially from Ostia and Rome, attest to the increasing importance of wine imports from the provinces. This has led some scholars to believe that provincial import replacement and competition during the Early Imperial period caused a crisis in Italian viticulture.[3]

Over the years, other studies have provided more nuanced explanations for these observed developments.[4] In particular, it seems unlikely that the decrease of amphora exports directly mirrors the end of Italian commercial wine production, but rather more likely that it reflects the reduction of a particular sector of the wine trade that had always been more oriented towards overseas rather than local markets.[5] The possible role of this domestic market as a driving force for agro-economic change in general—and for viticulture development in particular—has remained largely unexplored.[6] One key reason for this over-emphasis on provincial surplus extraction whilst underestimating the role of intra-regional consumption is archaeological representativeness. While amphorae in general are good indicators for viticulture intensification and expansion, they are only conspicuous in the archaeological record because of their durable nature. As these earthenware containers were rather designed for sea and river trade, their distribution was mostly restricted to coastal areas, or inland areas that were serviced by large navigable rivers. On the other hand, their fragility and shape undoubtedly rendered them less suitable for transporting goods overland by cart or pack animal. Perishable packaging materials such as sacks or barrels would have provided a more suitable solution. As the carriage of wine (and oil) produced in the territories of the many Italian towns and intended for local consumption frequently must have involved overland transport, much of this type of intra-regional provisioning is not clearly man-

2 Rosenstein (2008); Launaro (2011a, 168–169).

3 For central-Tyrrhenian Italy, see Carandini (1980); Panella (1981). For central-Adriatic Italy, see Panella (2010). For an overall synthesis, see Tchernia (2006).

4 Morley (1996, 10–11) provides a good overview.

5 Purcell (1985); Tchernia (1986, 285–299; 2006); Ikeguchi (2006).

6 For exceptions, see Hopkins (1978a); Patterson (1987); Morley (1996).

ifested in the archaeological record.[7] Hence, it remains difficult to fully assess the size of local demand and to envision how—and to what extent—changes in this demand over time may have influenced viticulture practices in their rural territories.

Still, there can be no doubt that the demand for wine (and oil) was substantial. Rome's growth in particular from c. 500,000 to c. 1 million inhabitants between the end of the 2nd century BC and the time of Augustus—and its likely continuing expansion in the 1st and 2nd centuries AD—had significant implications for central-Italian agriculture, initially in the capital's immediate hinterland, but later also in other parts of the peninsula.[8] Indeed, it has been argued that an increase in provincial imports in Rome and Ostia should not be viewed as a sign of crisis, but rather as an indication that agricultural production in the surrounding countryside became increasingly unable to supply the Urbs with sufficient amounts of wine and oil to satisfy the huge needs of its bulging population.[9] Obviously, Rome was a unique case by pre-modern standards, and no other town in Italy was as populous and wealthy as to face similar supply issues. However, throughout the Late Republican and Early Imperial period some 400 small and medium-sized towns expanded across the peninsula, and their aggregate population of c. 900,000 individuals likewise had to rely in the first place upon intra-regional production for their provisioning, before turning towards extra-regional imports.[10] In order to appraise the impact of this urban demand for wine, it is important to understand to what extent these towns' respective territories were able to satisfy it. Could they generate sufficient surpluses after subtracting the needs of the rural population? Ironically, in the case of wine or olive oil, much depended on the required volume of cereals. Indeed, the Roman Empire was a cereal-based peasant society, and grain always remained

7 Tchernia (1986, 285–292); Panella (1989, 162–163); De Sena (2005). This is not to say that amphorae could not have been used for land transport. Flat-bottomed or smaller and more solid amphora types in particular were more suitable for this purpose (Ghisleni et al. (2011, 120); Monsieur (2001, 180–183)). For the use of wooden barrels, see Marlière (2002).

8 Morley (1996, 39).

9 According to De Sena, Rome's hinterland could only provide c. 33% of the city's oil and c. 25% of its wine in the Early Imperial period. Furthermore, the amphora evidence points at considerable supplies from regions outside Latium, such as Etruria and Umbria, while the Adriatic area became an equally important supplier of foodstuffs to the capital in this period (De Sena (2005, 9, Fig. 3)). This way Italy would still have contributed only c. 50% of Rome's total wine supply (Marzano (2013a, 95)).

10 As argued by Jones (1964); Finley (1973); see also Hopkins (1980); De Sena (2003). For the total population figure, see De Ligt (2012a, 243–244).

the staple crop of Roman farming.[11] Moreover, the production per hectare was much lower than that of grape vines, and cereal cultivation therefore required much more land. It has also been argued that most of these cereals were produced locally.[12] It follows that the quantity and quality of land that could be devoted to viticulture, and the way in which this land was organized, may have depended heavily on local cereal requirements.[13] No satisfying reconstruction of the broader and economic context of wine can be achieved by looking at viticulture alone. Nonetheless, urban and rural consumption demand as a whole remains a marginally studied topic in Roman economic scholarship, and the evolution of Italy's urban network and its influence on the surrounding territories has yet to be incorporated fully into models of Late Republican, Early and High Imperial viticulture development.

In this chapter we explore this issue via a case study of the Ager Potentinus—i.e. the territory of the coastal colony of Potentia (Fig. 13.1)—and the three inland towns (Trea, Septempeda and Ricina) in the Potenza valley in today's central Marche (Picenum and Ager Gallicus). This will entail an integration of the contributions of overseas export and local consumption demand over time and their possible implications for the nature and extent of viticulture in the valley.[14] With this in mind, the first section will present the typology and chronology of central-Adriatic wine amphorae, in order to position the Ager Potentinus within the wider phenomenon of viticulture intensification that touched the central-Adriatic coast from the beginning of the 2nd century BC onwards.[15] In the second section we will attempt to sketch the evolution of the urban and rural population in the entire valley in the Late Republican and Early

11 Spurr (1986).

12 Jongman (1988, 78); Scheidel (1994, 159).

13 Comparative evidence from pre-industrial Europe indicates that local population dynamics and their associated cereal requirements may indeed play a decisive role in viticulture land use. For instance, during periods of population pressure farmers tended to reserve the better soils for cereals and to plant their grape vines on poorer soils (Grigg (1980); Van Leeuwen and Seguin (2006)).

14 The data used in this paper mainly derive from the results of the PVS project, a long-running geo-archaeological research programme of Ghent University which specifically focuses on the interaction between these four Roman settlements and their respective hinterlands (Vermeulen (2008; 2012); Vermeulen et al. (2005; 2009; 2011)). This project, directed by Frank Vermeulen, is largely financed by Ghent University, Belgian Science Policy (IUAP-actions) and the Fund for Scientific Research Flanders (Vermeulen (2017); Vermeulen et al. (2017)).

15 While the area from the third quarter of the 1st century BC onwards also produced oil containers, these are not discussed here (see *infra*, Note 29).

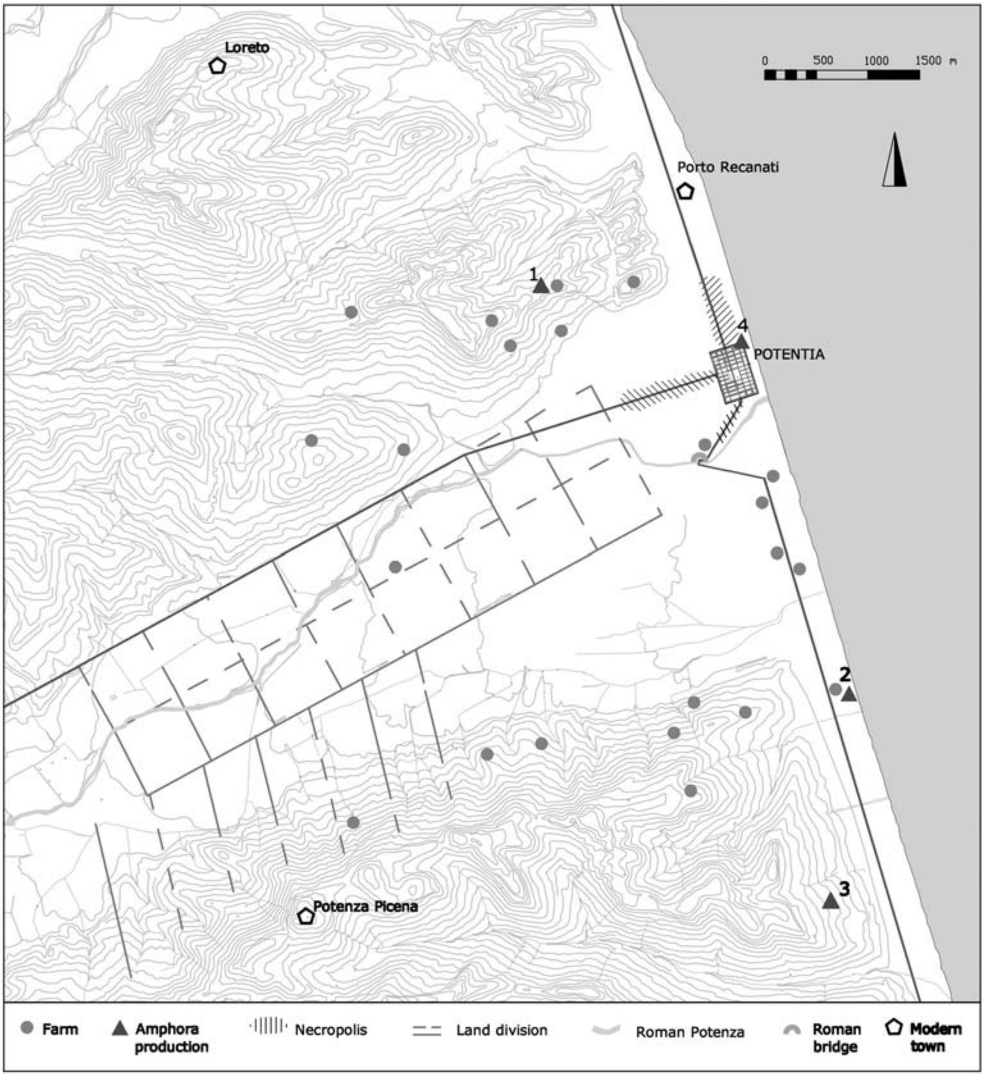

FIGURE 13.1 *Map of Potentia and its immediate surroundings, with indication of the amphora workshops*

Imperial period.[16] An estimate will be attempted of their food requirements in wine, oil and cereals, and the associated land requirements will be discussed in relation to the size of the territories of these towns. In a final section a tentative

16 This exercise made use of calculations proposed by De Graaf (2012) and based on the survey data generated by the PVS. A detailed demographic reconstruction of the valley on the basis of more recent survey results is currently being prepared by the PVS, but we believe

scenario will be presented for the evolution of the viticulture landscape of the lower Potenza valley and the wider Adriatic coastal area between c. 200 BC and AD 150.[17]

2 Amphorae and Wine Exports from the Ager Potentinus

The systematic study of central-Adriatic wine amphorae is still in its infancy, but it is already clear that they can be classified into four main typological groups: Graeco-Italic, Lamboglia 2, Dressel 6A and Dressel 2–4.[18] Overall, their production approximately covers a period of some 300 years between c. 200/175 BC and the beginning of the 2nd century AD.[19] The late Graeco-Italic group probably appeared somewhere during the first quarter of the 2nd century BC or even the last quarter of the 3rd century BC.[20] In the course of the same century this slender type grew sturdier, and around 125/100 BC it merged into the classic Lamboglia 2 type (Figs. 13.2 and 13.3). In the Augustan age, around 25 BC, this type evolved into the larger and more massive Dressel 6A. Around the turn of the century, while the Dressel 6A continued to be produced, the new Adriatic Dressel 2–4 with its typical double-barrelled handles was introduced (Fig. 13.4). In the first quarter of the 1st century AD this type gradually replaced the Dressel 6A, continuing until at least AD 100.[21]

that De Graaf's figures still provide a representative approximation. For an updated summary and further references, see Vermeulen (2012); Vermeulen and Mlekuz (2012).

17 Due to constraints of space we are only able to sketch the broad outlines of a model that is currently being developed in more detail for the wider central-Adriatic area in the Late Republican and Early Imperial period in the context of PhD research conducted by the first author at the Universities of Ghent (Belgium) and Pisa (Italy), jointly directed by Frank Vermeulen (Ghent) and Maria Letizia Gualandi (Pisa).

18 For the Graeco-Italic forerunners of the 4th and 3rd centuries BC (which are not discussed here), see Toniolo (2000).

19 Carre (1985); Cipriano and Carre (1989); Pesavento Mattioli (1992); Bruno (1995, 27–46); Toniolo (2000); Starac (2001); Menchelli (2011b).

20 PVS excavations in the area of the western gate of Potentia led to the discovery of several Graeco-Italic amphora fragments associated with the Republican city wall; Livy dates its construction to around 175/174 BC (XXXIX, 44, 10). Most of these fragments were produced at the nearby workshop Colle Burchio (see *infra*). Together with the examples found at Rimini they represent one of the earliest known central-Adriatic Graeco-Italic productions (Stoppioni (2013); Monsieur et al. in Vermeulen (2003); Vermeulen et al. (2011); Vermeulen and Monsieur (2012)).

21 In view of the lack of data we chose not to include the central-Adriatic flat-bottomed

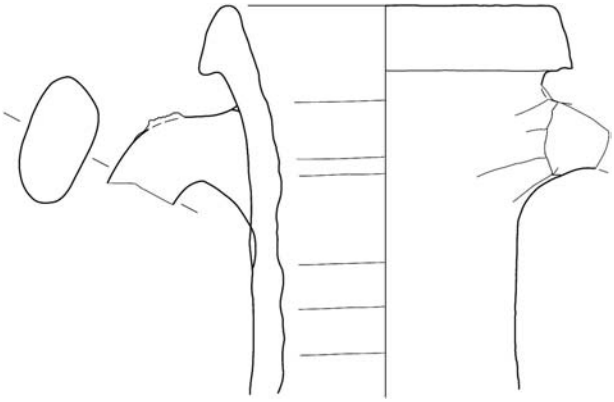

FIGURE 13.2 *Upper part of an amphora of the transition type Graeco-Italic to Lamboglia 2 produced in the workshop of Acquabona* (Ager Potentinus)*; c. 100 BC*

The most important region producing these containers seems to have been the c. 250 km-long central section of the coastline between Rimini and Pescara (i.e. the Ager Gallicus and Picenum), an area roughly corresponding to today's Marche and Abruzzo. For a long time the only known amphora workshops were at Cologna Marina, Torre di Palma, San Benedetto del Tronto, Cesano di Senigallia and Marina di Città Sant'Angelo near Pescara.[22] However, surveys by the University of Pisa in the Ager Firmanus in 2006 and 2007 (i.e. the territory of Firmum in the southern part of Picenum) revealed a new cluster of seven workshops to the north-east of the Roman town, between the valleys of the rivers Tenna and Ete.[23] A similar cluster of four definite workshops and three probable ones was observed by the Potenza Valley Survey project (PVS) in the lower Potenza valley, in the Ager Potentinus north and south of Potentia (Fig. 13.1).[24]

amphorae (see *infra*). Their production probably started in the last quarter of the 1st century AD and continued until the 3rd century AD. There is some evidence for production in the centre and south of Picenum, but the only workshops currently known are in the regions of Forlimpopoli and Rimini (Aldini (1978); Carre (1985, 228–231 and 235–241); Tchernia (1986, 253–256); Cipriano and Carre (1989, 88–90); Maioli and Stoppioni (1989, 574–575); Panella (2001, 195); Monsieur (2007); Menchelli et al. (2008, 388); Menchelli (2011b, 242)).

22 Mercando (1979, 110–131); Brecciaroli Taborelli (1984); Cipriano and Carre (1989); Staffa (2003).

23 Menchelli and Ciuccarelli (2009); Menchelli (2012).

24 Vermeulen (2003; 2005); Monsieur et al. (2006); Monsieur (2007; 2009); Monsieur et al. (2009; 2013); Braekmans et al. (in press); cf. Mercando (1979, 185–187; 208–225).

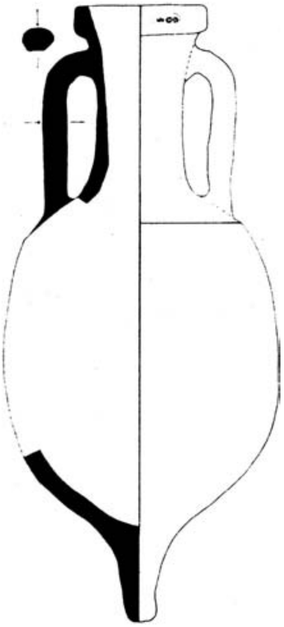

FIGURE 13.3
Lamboglia 2 amphora with stamp on the rim of Diodorus *from the House of the Porch at Ostia; first quarter 1st century* BC (*After Van der Werff* (*1986, pl.* III*, 4, n. 23*))

FIGURE 13.4
Handle fragment of a Dressel 2–4 amphora found in the workshop of Acquabona (Ager Potentinus) *and possibly produced there; 1st century* AD

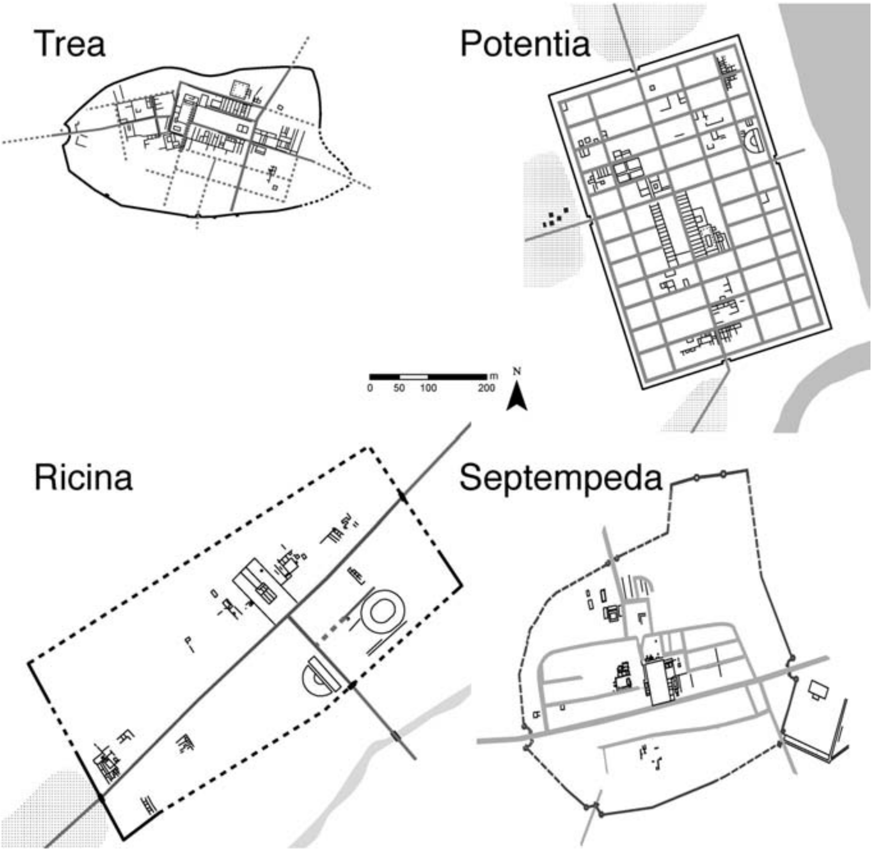

FIGURE 13.5 *The four Roman towns in the Potenza valley (After Vermeulen and Mlekuz (2012, Fig. 20.6))*

Except for the Dressel 2–4 and the flat-bottomed types all central-Adriatic amphora types are represented at these sites.[25] The amphora production in the area seems to have started shortly after the colony was founded in 184/183 BC (Livy XXIX, 44, 10), at the site Colle Burchio (Fig. 13.1, 1), a workshop that manufactured the Graeco-Italic types during the first half of the 2nd century BC.[26] A second site, Acquabona (Fig. 13.1, 2 and Fig. 13.6), producing the Lamboglia 2 and Dressel 6A types, was presumably active from the first quarter of the 1st century BC until the second quarter of the 1st century AD, a period of c. 125 years

25 The workshop at Acquabona yielded some Dressel 2–4 handle fragments, but they were all discovered out of context.

26 See above, note 20.

FIGURE 13.6 *Store-rooms and living quarters in the Acquabona workshop* (Ager Potentinus)*: walls built with sherds of Dressel 6A and B amphorae; Augustan period*

(Figs. 13.1 and 13.4).[27] The workshops at Casa Alvata III and La Pineta (Fig. 13.1, 3–4) only produced evidence for production in the Augustan and Tiberian periods (c. 25 BC–AD 25).[28]

As was the case with Firmum Picenum in the Ager Firmanus—or at least its port Castellum Firmanorum—Potentia was one of a series of harbor towns that were established by the Roman authorities along the central Adriatic coast in the 3rd and 2nd century BC (cf. Pisaurum, Sena Gallica, Ancona and Castrum Novum). The concentration of amphora workshops within their immediate territories may well indicate that they created a proper gateway to the stabile overseas markets created by Rome's expansion policy. In this way, they motivated an increase in the production of wine and the ensuing fabrication of transport containers. Like their central-Tyrrhenian counterparts, these central-Adriatic transport vessels are widespread throughout the Empire. The

27 Monsieur (2009); cf. Mercando (1979, 281–290).

28 The workshops at Acquabona and La Pineta also produced oil amphorae of the Dressel 6B type (50/25 BC–AD 25/50) as well as its forerunner, the so-called 'Brindisi' type (only Acquabona).

major consumption regions of these amphorae have been fairly well documented; they seem to have included northern Italy, Dalmatia, Greece, Asia Minor, Alexandria and Rome. Although these amphorae occur less frequently in North Africa, Iberia, Gaul, Germania, Noricum and Pannonia, their importance in these areas should not be underestimated.[29] Central-Adriatic wine exports clearly peaked between c. 125 and 50 BC, as shown by the massive presence of the Lamboglia 2 in northern Italy and the most important commercial centres in the East. Later wine exports, up to the Late Augustan period, were decisively on a more limited scale, but Dressel 6A amphorae are still present in appreciable quantities on sites in both East and West. It is difficult on the basis of current knowledge to assess the actual quantitative impact of the central-Adriatic version of the Dressel 2–4. Its inland distribution was still substantial, but it is possible that these vessels were no longer found in large numbers outside Italy.[30] Likewise, the lower Po valley began to assert itself on the wine market with its own versions of the Dressel 6A and the Dressel 2–4 from the Augustan era onwards, at the expense of the central-Adriatic area.[31] From the Flavian period, flat-bottomed amphorae appeared in the central-Adriatic area, with the varieties from Forlimpopoli in particular enjoying a certain measure of success.[32]

There can be no doubt that the gradual decrease of central-Adriatic overseas exports from the Augustan period onwards—which resembles the downward trend attested for the central-Tyrrhenian amphorae—reflects considerable changes in the nature and extent of the central-Adriatic wine trade. It is equally clear that these changes are to some degree related to the loss of the provincial markets and to competition from within Italy. However, the presence of noticeable quantities of local Adriatic Dressel 2–4 on several urban

29 Tchernia (1986, 68–74); Van der Werff (1986); Cipriano and Carre (1989); Will (1989); Pesavento Mattioli (1992); Bezeczky (1994); Bruno (1995); Nonnis (2001); Márquez Villora and Molina Vidal (2005); for a recent, excellent overview, see Menchelli (2011b). For Germania in particular substantial quantities have been identified at the legionary bases at Dangstetten (Ehmig (2010)) and Haltern (ongoing research by P. Monsieur, H. Gonzales (University of Barcelona), B. Tremmel (Provincial Roman Department of the Landschaftsverband Westfalen-Lippe) and T. Mattern (University of Trier)).

30 As recent surveys in the towns of Ricina (middle Potenza valley, PVS-survey) and Suasa (middle Cesano valley, with thanks to Anna Gamberini, University of Bologna) in central and northern Marche have shown. Nevertheless, examples have been identified at several sites outside Marche, such as Rome (Cafini and D'Alessandro (2010)), Libya (Cipriano and Carre (1989)), Ephesus (Bezeczky (2010)) and Haltern (cf. Note 29).

31 Zaccaria (1989, 477–478); Mazzocchin (2008); Mongardi (2013).

32 See Note 21.

and rural sites in the Potenza valley, in combination with a lack of older types, may also reflect a partial re-orientation of the local wine industry in the course of the 1st century AD from long-distance trade towards regional provisioning.[33] Analyzing this local demand is not straightforward. Presumably, actual demand was much greater than what we observe. Indeed, other, 'perishable' containers became important for the transport of wine in this period—especially wooden casks—and even more so in the 2nd century AD, when locally made amphorae disappeared entirely and wooden barrels probably became the only transport container for wines produced in the central-Adriatic coastal regions.[34] Still, intra-regional production was presumably able to meet this local demand for wine almost entirely, as the region seems never to have become a massive consumer of food from the provinces.[35] In order to be able to assess the precise extent to which the loss of the provincial markets was compensated by the rise of intra-regional consumption entities, and the potential impact of this process on agriculture and viticulture in the area, we need to look at the towns and the countryside themselves.

3 Population, Food and Land Requirements in the Potenza Valley

The Augustan era effectively marks a key moment in the urbanization history of the area. Until the beginning of the 1st century BC, urban presence in the region was mostly limited to a few Roman and Latin colonies.[36] Their demographic and economic impact was probably small, as these 'Roman islands'

33 See Note 30.

34 This is vividly illustrated by the iconography on the sarcophagus of an unknown wine merchant from Ancona, dating to the late 2nd or in the first half of the 3rd century AD (Profumo (2005); cf. also Paci (2009, 9), for a monument to a cooper at Cupra Marittima in southern Picenum).

35 The situation in the Potenza valley is exemplary. Imported specimens earlier then c. AD 75 are very rare and mostly consist of occasional fragments of northern Italian wine and oil amphorae (Dressel 2–4; Dressel 6B). In the last quarter of the 1st century AD and in the course of the 2nd century AD, imports began to rise but were still relatively moderate: flat-bottomed wine amphorae (the so-called Forlimpopoli types) from the Po valley; amphorae of the Knossos-19 type from Kos (or the coast of Asia Minor) and the Dressel 43 type from Crete (Mercando (1974); Monsieur (2007); Panella (2010)).

36 Only five colonies were established in the 3rd century BC, i.e. at Picenum and the Ager Gallicus: Aesis (247 BC), Castrum Novum (289–283 BC), Firmum (264 BC), Hadria (290–286 BC) and Sena Gallica (289–283 BC). The colonies of Auximum (174–156 BC), Pisaurum and Potentia (184 BC) were established in the 2nd century BC.

were situated on the coast while inland areas remained virtually untouched by the process. Much the territory was first urbanized in the course of the 1st century AD, when no fewer than 32 settlements were elevated to municipal status. Consequently, the central-Adriatic region, with 40 towns in Picenum and the Ager Gallicus, became one of the more urbanized areas of High Imperial Italy.[37] While most of these towns were small—only nine covered more than 20 ha and only four exceeded 40 ha—together they may have accounted for a population of c. 68,000–98,000 individuals.[38] From the start of the 1st century AD in particular, this process seems to have been accompanied by a significant increase in urban and rural populations, in the aftermath of a vast program of veteran resettlement and large-scale land distribution in the Augustan period.[39] In fact, assuming a conventional urbanization rate of 20 %, another 272,000–392,000 individuals may have been living in the countryside, bringing the total population of this area (c. 11,600 km²) to 340,000–490,000 individuals; a considerable number indeed.

The urbanization history of the Potenza valley in particular is emblematic for the wider central-Adriatic area. For about a hundred years after its foundation Potentia was the only real 'urban' centre in the valley (c. 184–100 BC). During this period the occupation form of the three inland centres (Ricina, Trea and Septempeda) was probably relevant but they nonetheless lacked a proper urban character. At the end of the 2nd or in the early 1st century BC, Septempeda evolved into a more regularly planned settlement encompassed by a circuit wall. Trea and Ricina, on the other hand, only received urban status between the mid-1st century BC and the Augustan period, when they, too, were surrounded by town walls and equipped with a full complement of urban monuments.[40] The overall picture, then, for the Potenza valley is one of relatively constant urban growth from the early 2nd century BC until the mid-2nd century AD. We are well aware that extrapolating an approximate population figure for these four towns at any moment in their occupation history on the basis of the towns' area and internal plan—let alone tracing their demographic evolution through time—is a hazardous exercise. Yet is it necessary in order to

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37 3.5 towns per 1000 km² in Picenum and 4.9 towns per 1000 km² in the Ager Gallicus (Jongman (1988, 70, Table 1), after Duncan-Jones (1982, 337 ff.)).

38 Based on commonly used population densities of 90–130 persons/ha for small and medium-sized Roman towns in central Italy (De Ligt (2008; 2012a and b)).

39 Paci (1994–1995); Corsi (2008). It seems that these operations also caused significant land shortages in the area. For a discussion based on epigraphic evidence from Pisaurum and Asculum Picenum, see Paci (1996–1997).

40 Vermeulen (2012).

be able to assess these towns' likely consumption requirements.[41] Any attempt to arrive at exact figures for the number of individuals living in these towns is obviously pointless. That being said, ten years of intensive aerial photography analysis, large-scale geophysical survey and systematic field walking in the context of the PVS in these towns—together with excavations in the area of the western town gate of Potentia—have resulted in significant advancements in our understanding of the topography and evolution of these urban settlements (Fig. 13.5). These results should at least enable us to come up with numerically justifiable estimates for the towns' population densities during their heyday—i.e. roughly between the mid-1st century BC and the mid-2nd century AD—and to get some idea of their occupation in the Late Republican period.

The best dataset is undoubtedly that of Potentia, where three main phases have been identified. The first phase relates to the early years of the colony, between 184 and 174 BC, and represents the initial organization of the town after the colonists' arrival. At that time the town—probably enclosed by an earthen bank (*agger*) with palisade and a ditch—occupied an area of c. 525 × 300 m (15.7 ha). In 174 BC the colony was fully urbanized and a circuit wall with three gates was built. The town's area remained more or less unchanged, covering c. 16 ha regularly subdivided into c. 50 *insulae*. A likely third phase, probably after the mid-1st century BC, encompassed an extension of the walled space by some 50 m to the east. The town was enlarged with 11–12 *insulae* and now measured 525 × 350 m, or c. 18 ha, *intra muros*.[42] As Potentia was clearly flourishing during the Augustan era and the High Imperial period (late 1st and 2nd century AD), it is possible that suburban quarters were gradually added along the town's main exit roads in the course of the 1st century AD, but any archaeological evidence for *extra muros* residential buildings is currently thin.[43] Less information is available on the lay-out of the three inland civic centres of the Potenza valley,

41 The number of persons per hectare varied considerably due to differences between the towns in their architectural make-up (e.g. the type of housing, or the use of upper storeys) or changes in the ratio between empty and built-up space over time. For instance, the huge difference in calculated population density between on the one hand Cosa (101–121) and Pompeii (120–130), and on the other Ostia (290–840) and Rome (440–560), can largely be explained by the dominance of *domus*-type buildings in the former group, and the use of multi-storey *insulae* in the latter. See Wallace-Hadrill (1994); Lo Cascio (1999b). For a full discussion, see De Ligt (2008; 2012a and b).

42 Vermeulen et al. (2011); Vermeulen (2012). See Vermeulen and Carboni (2010) on the possible relationship between the reorganization of the town space and a major earthquake in the mid-1st century BC (Cicero, *De Har. Resp.*, 28, 62).

43 On epigraphic evidence for the town's flourishing development, see Paci (1995). The PVS surveys at the town site suggest that the full intra-mural area was thickly built over in

but enough to warrant the conclusion that at least in size and design they were comparable to Potentia. With a total walled area of c. 22 ha, the presence of the largest theatre of Picenum as well as the only amphitheatre in the Potenza valley, Ricina was clearly the largest and most important settlement.[44] Next, at 15 ha, came Septempeda.[45] Trea was the smallest of the four, with an intramural area of merely 11 ha. Again, the heyday of all three inland towns was in the 1st and 2nd centuries AD, but whether or not they ever acquired suburbs is uncertain.[46] The currently confirmed amount of total urban space is thus c. 66 ha.[47]

In a recent study based on the results of the PVS, Peter De Graaf draws attention to the resemblance of Potentia's lay-out to the architectural make-up of towns such as Cosa and Pompeii, suggestive of population densities of between 93–112 and 113–136 persons per ha, or a total population of c. 1,674–2,016 or 2,034–2,448 individuals.[48] As similar population densities may be assumed for Ricina, Trea and Septempeda, the total urban population may have ranged from c. 6,138 to 8,976 individuals between c. 50 BC and AD 150.[49] In fact, the PVS surveys and excavations strongly suggest that Potentia's entire town area was intensively built over in the course of the 1st century AD, and that a relatively high occupation density (approaching 113–136 p/ha) may be assumed for this period.[50] It is more difficult to estimate the population of these civic centres in

the 1st and 2nd century AD, and that the immediate suburban areas may also have been occupied (Vermeulen (2008, 239)).

44 Vermeulen et al. (2005, 40); Vermeulen (2012).

45 Vermeulen and Mlekuz (2012).

46 On Trea's urban development, see Vermeulen et al. (2012).

47 If extramural extensions indeed occurred in the 1st century AD, they may have increased the occupied urban space by 50% (De Ligt (2012a, 204 Note 40)). Even an additional 25% would mean an extra 16.5 ha of urban space. For the development of suburbs outside the walls of Pisaurum as early as the 1st century BC, see Di Cocco (2004, 65–66).

48 De Graaf (2012, 42–44) suggested a total of either 1,920–2,304 or 2,332–2,799 individuals for Potentia, but these figures are based on a presumed *intra muros* area of c. 20.6 ha, while 18 ha is more likely (Vermeulen and Mlekuz (2012, 216 Table 20.2)). In his calculations of the overall population of the Potenza valley De Graaf used a constant average density of 124 persons/ha for the four towns; this resulted in a population for Potentia of c. 2,230 individuals (De Graaf (2012, 49)).

49 Including possible suburbs, an extra 1,535–2,244 individuals (conservative estimate of 25%) can be added to this number for the 2nd century AD, resulting in a total urban population in the valley of c. 7,673–11,220 individuals.

50 Vermeulen (2008). That the saturation point of the town area may have been reached already in the second half of the 1st century BC is further hinted at by its extension by c. 2 ha.

the Late Republican period, but the archaeological evidence for Potentia suggests that in the 2nd century BC most of the colony's intramural sectors were only thinly occupied. It seems therefore unlikely that the entire town area was densely built-up in this period, or that its occupation had already reached its maximum.[51] Hence, it seems reasonable to assume a lower occupation density for the town, in the order of 93–112 p/ha. The contrast with the three inland agglomerations Ricina, Trea and Septempeda was probably even more pronounced, as they were mere road stations or service centres during the the 2nd century AD, with probably no more than a few hundred inhabitants.[52] Complementary surveys carried out by the PVS in the territories of these four towns resulted in the registration of 84 fairly precisely dated Roman rural sites in the lower, middle and upper valley sections combined.[53] On the basis of these results De Graaf proposed a rural population density of 38–55 individuals/km^2 in the Late Republican period and 63–89 individuals/km^2 in the Early Imperial period, resulting in a total rural population of 22,002 to 31,845 individuals in the Late Republican period and 36,477 to 51,531 in the Early Imperial period.[54] These observations indicate that for much of the Late Republican period the urban and the rural populations were both significantly smaller than in the Early and High Imperial period. These conclusions were further explored in two scenarios. The first assumed lower urban (90 p/ha) and rural (38 p/km^2) population densities (S1), while the second assumed higher densities for both (135 p/ha and 89 p/km^2 respectively) (S2). The first scenario may apply to the

51 Vermeulen (2008); De Ligt (2012a).

52 A population of 100 or 200 individuals is often assumed for road stations (De Graaf (2012)). It goes without saying that the population of these centres will have fluctuated and probably grew in the course of the Late Republican period, especially in the first half of the 1st century BC, when Septempeda evolved into a more 'urban' centre (see *supra*).

53 The respective site densities for the three PVS sampling zones are 11.73 sites/km^2 for the upper valley (3.15 km^2 transect), 3.73 sites/km^2 for the middle valley (3.7 km^2 transect), and 8.24 sites/km^2 for the lower valley (40 km^2 transect). The total rural population figures refer to the hypothetical territories of the four towns, as defined by Thiessen polygons: 112 km^2 for Potentia, 197 km^2 for Ricina, 121 km^2 for Trea, and 149 km^2 for Septempeda. Together they cover some 579 km^2 (Vermeulen and Mlekuz (2012); see also Note 14).

54 In his calculations De Graaf (2012) assumed a 100% recovery rate for the surveys. The difference in calculated population densities is the result of two different scenarios for the villa/farm ratio. Whilst acknowledging that assessing rural population size on the basis of survey data is highly complicated, we cannot discuss here the many variables that influence survey recovery rates. For an insightful and stimulating discussion on the issue, see Witcher (2011).

Late Republican period, while the second scenario could apply to the Early and High Imperial periods.

It is very difficult to translate the actual daily consumption of these people into exact numbers. According to the FAO's *Energy and Protein Requirements*, adult males need 2,900 to 3,530 calories daily, depending on their level of activity, while adult females need 2,170 to 2,400 calories.[55] Based on these FAO statistics, various Roman literary sources and estimates of the components of Greek and Roman diet, Helen Goodchild calculated the absolute minimum and maximum daily food intake of Roman agricultural workers (male and female combined) to be 1,951 and 3,798 calories, respectively.[56] A daily intake of 2,000 to 3,500 calories seems to be a reasonable average. It is generally assumed that cereals constituted 65% to 85% of the average Roman diet. The contribution of wine and olive oil is usually estimated at 10% to 15%.[57] Assuming a diet composed of 75% cereals, 10% wine, 5% oil and 10% other foodstuffs, this would imply an annual per capita consumption of c. 165–288kg of wheat, c. 105–182l of wine, and c. 4–7l of oil.[58] Using these numbers it is possible to examine the implications of the two scenarios outlined above for, respectively, a poorly fed (2,000-cal./day, Option A) and a well-fed (3,500-cal./day; Option

55 *Energy and Protein Requirements: Report of a Joint FAO/WHO/UNU/Expert Consultation*; see also Rosenstein (2004, 66–67). The figures include males aged between 18 and 60 years and weighing 65kg; and females between 30 and 60 years and weighing 55kg.

56 These figures include both the lowest intake for a 3-hour working day and the highest intake for a 9-hour working day (Goodchild (2007, 324 Table 7.13)).

57 Jongman (1988, 79–80); Foxhall and Forbes (1982, 74); Gallant (1991, 68). Of course, there was no such thing as a standard Roman diet; regional and chronological variations were almost certainly considerable. While cereals, grapes, and olives will have formed the bulk of the daily food intake the diet was supplemented by other foodstuffs, such as fruits, vegetables, meat and dairy products, and fish.

58 Based on the assumption that 1kg of wheat equals c. 3,340 calories; 1l of wine c. 704 calories; and 1l of olive oil c. 8,878 calories. An average annual consumption of 200kg of wheat per person is generally regarded as realistic for the Roman period (Foxhall and Forbes (1982); see also Jongman (2003, 115 Note 68); Kehoe (1988a, 14–15)). Much higher estimates for the annual consumption of olive oil have been proposed by David Mattingly (20–25l), Jean-Pierre Brun (50l) and Lin Foxhall (40–60l), but these include oil used for illumination, bathing, personal hygiene and medicine (Mattingly (1988, 34); Brun (2003, 169); Foxhall (2007, 86)). Again referring to Cato (*RR* 57), André Tchernia has argued for an annual wine consumption per male individual in Late Republican and Early Imperial Rome of 140 to 180l, while females would have consumed about half as much (70 to 90l) (Tchernia (1986, 26)). An average annual consumption of 100l of wine per person is often assumed for Roman and pre-industrial Mediterranean societies (for references, see Jongman (2003, 113–114 Note 61)).

B) urban and rural population. In Scenario 1 the total grain consumption is 4,610,430 (A) to 8,047,296 (B) kg, that of wine 2,933,910 to 5,085,444 l, and that of oil 111,768 to 195,594 l. In Scenario 2 the respective numbers are 9,972,765 (A) to 17,407,008 (B) kg of cereals; 6,346,305 to 11,000,262 l of wine; and 241,764–423,087 l of oil. For an assessment of the area of land required to produce these quantities of food and a comparison of this outcome with the size of the town territories, we assumed a net yield for each hectare of agricultural land in Roman times of either 400 kg of wheat, 2,100 l of wine, or 450 l of oil (Figure 13.7).[59]

In Scenario 1, between 23 and 40 % of the hinterland would be required to produce the necessary amount of food. In Scenario 2, this would have been 50 to 85 %, depending on the living standard of the population. Most of this land would be needed to produce the required amount of cereals. Since it is likely that wheat production in this area in the Roman period was largely confined to the coastal plains and the lower valley sections, the combined effects of a growing urban and a large rural population are thrown into sharp relief when considering the case of Potentia and its territory. The most fertile soils were situated in that town's coastal plain.[60] In order to provide all urban as well as rural residents of Potentia and its territory with sufficient wheat, c. 24–42 km^2 land would be required in the first scenario, and c. 51–89 km^2 in the second. However, the total area of the coastal plain is only c. 42 km^2 (Figure 13.8). This clearly illustrates how the urbanization of the entire valley in the Early Imperial period profoundly affected agricultural practices and land use, especially in the lower valley sections, i.e. precisely the zone where wine was being produced for the extra-regional market.

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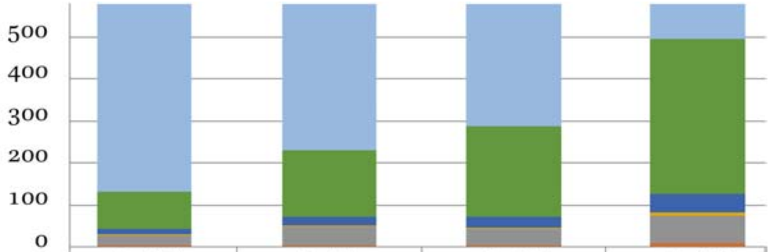
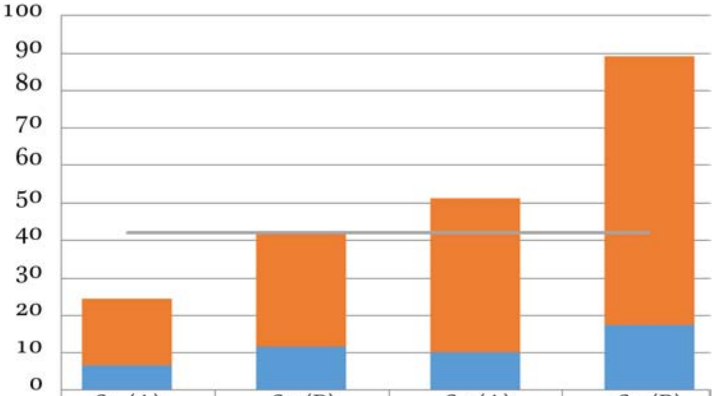
59 Annual yields for wheat depended heavily on sowing rates and the amount of rainfall (Kehoe (2007b, 551)), but assuming a two-field system, a net yield of 400 kg/ha is accepted as a realistic average for most parts of Roman Italy (Spurr (1986); Jongman (2003, 115); Kehoe (2007b, 551)). Grape and olive harvests varied even more from year to year as they were influenced by a wide range of factors—geologic and climatic conditions, cultivation or planting strategies, available farming equipment—which determined the yield of individual vines and olive trees as well as planting density. Columella's minimum estimate of 2,100 l/ha is often used as a benchmark for vineyards (Kron (2012, 159)). The estimated yield of olive groves is based on a density of 150 trees/ha, an individual yield of c. 15 kg of olives/tree, and a 20 % return of oil per quantity of fruits; all these figures are accepted as realistic averages for the Roman period (for a discussion of tree spacing, see Mattingly (1994); for possible yields per tree, see Frank (1933); White (1970); Antolini (1986); Osborne (1987); Forbes (1992); Brun (2003); for oil/olive extraction rates, see Cresswell (1965) in Mattingly (1988); Mattingly (1993, 484); Brun (2003, 142–144)).

60 Cristofori (2004).



	S1 (A)	S1 (B)	S2 (A)	S2 (B)
Not used	447.4	349.3	293.9	82
Cereals (r)	90.8	158.4	212.6	371
Wine (r)	11	19.1	25.8	44.7
Oil (r)	1.9	3.4	4.6	8
Cereals (u)	24.5	42.8	36.8	64.2
Wine (u)	2.9	5.1	4.5	7.7
Oil (u)	0.5	0.9	0.8	1.4

FIGURE 13.7 *Possible land requirements in the Potenza valley in relation to the territories of the towns* (km^2) ((*u*) *means urban,* (*r*) *means rural*)



	S1 (A)	S1 (B)	S2 (A)	S2 (B)
Potentia (r)	17.6	30.7	41.1	71.8
Potentia (u)	6.7	11.7	10	17.5
Coastal Plain	42	42	42	42

FIGURE 13.8 *Land requirements for cereals in the lower Potenza valley in relation to the coastal plain* (km^2) ((*u*) *means urban,* (*r*) *means rural*)

4 Intensive vs. Extensive Viticulture

Texts written by ancient agronomists elucidate that Roman farmers knew many ways to train and cultivate the grape vine.[61] An important distinction is that between intensive—i.e. grape vines kept low or trained along rows on a separate piece of land—and extensive cultivation, whereby grape vines and other crops shared the same field. The former type was referred to by the term *vinea*—literally 'vineyard'—and its most pronounced advocate was clearly Columella (*RR*, III; V) (Fig. 13.9).

The latter type could take various forms. Pliny, for instance, mentions a type of extensive grape vine plantation typical for Umbria and Marsia, called *porculetum*, in which grape vines were planted in rows spaced 20 ft. apart (c. 6 m), thus leaving ample space in-between for the cultivation of cereals (*NH*, XVII, 35). The most widespread form of extensive viticulture in central and northern Italy, however, was the *arbustum*, a form of polyculture in which grape vines were trained along rows of trees in combination with cereal cultivation (Fig. 13.10).[62] Both systems—*vinea* and *arbustum*—had obvious benefits and disadvantages, and the choice between the two depended not only on the expected yield but also on local agro-economic conditions and the availability of suitable land. Vineyards were the most labor-intensive type but also the most profitable, while tree-supported grape vines compensated their smaller yields by lower labor costs and the advantage of supplementary crops.[63] Indeed, the *arbustum* offered farmers the possibility to harvest a wide range of crops from the same piece of land, mostly cereals and grapes, but also other crops such as olives (if olive trees were used to train the vines), fruits, wood and fodder.[64] In addition, training grape vines high up in trees conformed to the species' natural tendency to climb while also protecting the grapes from the damaging effects of water and frost caused by soil humidity in the more level parts of plains and valley-floors. A form of polyculture with extensive viticulture, similar to the *arbustum*, was probably the traditional practice in many places in Marche, Emilia Romagna, Tuscany and the Po plain for most of Italian and Roman history.[65] Lower grape vines arranged in more intensive plantations of

61 For an overview, see White (1970, 231–236).

62 White (1970); see also Braconi (2008a and b; 2012).

63 Duncan-Jones (1982, 39 and 59).

64 The olive tree ranks fifth in Pliny's classification of trees suitable to train vines (*NH*, XVII, 3).

65 Varro in particular expresses an opinion on the matter (*Rust.* I, VIII, 6). According to Emilio Sereni, the diffusion of the *arbustum*—and later the '*alberata*' (see *infra*)—in these areas

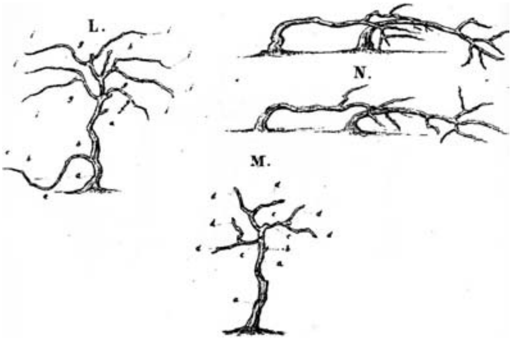


FIGURE 13.9
Low-trained vines without a support, usually placed in vine plantations of the vinea*-type (After Bastiani (1851))*

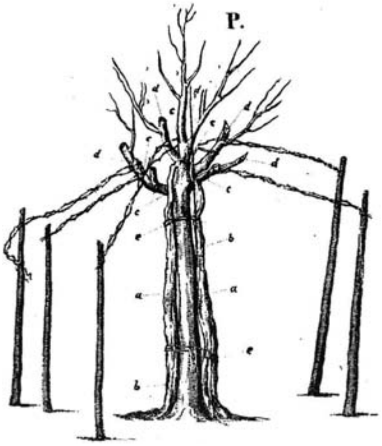


FIGURE 13.10
High-trained vines wedded to a tree, typically for an arbustum *(After Bastiani (1851))*

the *vinea*-type could certainly thrive in the area, but only if suitable land was available on the hill slopes and plateaus.

During most of the Late Republican period internal food demands were probably relatively modest. While the opening up of external markets in the course of the 2nd and early 1st century BC stimulated an intensification of viticulture in the Potenza valley and the wider central-Adriatic area, there was still ample room to select the most suitable land for viticulture in order to maximize profits. Presumably the process at first mainly involved an intensification and by implication reorganization and expansion of existing mixed vine plantations.[66] But as the external consumption markets continued to grow, a point

of central and northern Italy is linked not only to these specific environmental conditions but also to the expansion of the Etruscan civilization (Sereni (1961, 40–43)).

66 This tendency towards a more intensive and organized form of viticulture in the area as

was reached where it probably became more profitable to replace a substantial part of these extensive fields by more intensive vineyards, or *vinea*.[67] It is this on-going intensification process which the amphorae discussed earlier in this chapter illustrate so well.[68] From the Augustan period onwards, however, this highly favourable situation changed considerably. If local cereal demands indeed rose as sharply as has been suggested, and if this increase was mainly met by local production, the effect would have been that the best cereal land became increasingly scarce or was even no longer available. This would have made it impossible to continue with the viticulture practices used before—especially in the lower valley sections, where wine was being produced for the extra-regional market—as that would have forced cereal culture to expand into the hills, lower and higher, which slope towards the sea, i.e. the very land most suitable for specialized and intensified viticulture. The impact of the process on the organization of viticulture land in the area is obvious.

We would still be in the dark about the nature of this impact, were it not for the striking consequences for viticulture of a similar process of urban population growth in the region in the 15th and 16th century AD. A massive demand for grain in this period—not only by the many Marche towns but also by larger cities such as Rome and Venice—stimulated the reclamation of almost every available piece of uncultivated land and the reorganization of land that was already under cultivation. As the huge demand for grain had to be reconciled with an equally substantial demand for wine, viticulture practices were adapted accordingly. Many of the vineyards (Fig. 13.11) were gradually replaced by the so-called '*alberata*' or '*folignata*', a grape cultivation system almost identical to the aforementioned *arbustum* (Fig. 13.12).[69] As we

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early as the late 3rd and early 2nd century BC are illustrated by Cato's guidelines for setting up a proper—probably still mixed—vine plantation (*RR*, XI), and by his reference to a record harvest of c. 200 hl/ha in the Ager Gallicus, i.e. the northern part of the Marche, adjacent to Picenum (cited by Varro, *Rust.* 2.1.7).

67 On the basis of readings of Cato (234–149 BC) and Varro (116–27 BC) it has been argued that this transition took place somewhere in the second half of the 2nd century BC (Braconi (2008b)).

68 The process is also manifest in archaeobotanical data generated by the excavation of a Roman rural settlement at Senigallia (Ager Gallicus), where grape pips become increasingly more prominent at the expense of cereal grains between the mid-2nd century BC and the Augustan period. Incidentally, this same period roughly coincides with the Lamboglia 2 and the Dressel 6A amphorae (Lepore et al. (2012)).

69 In essence, the systems were merely adaptations of two vine cultivation techniques that had been used in Marche and Emilia Romagna since the 13th century AD: the '*piantata*', in which vines were trained upon rows of trees such as elm, maple, willow and poplar on

FIGURE 13.11 *Small subsistence vineyard in the middle Potenza valley near Treia*

saw earlier, the most important advantage of the '*alberata*' was that it allowed for the expansion of viticulture into the low-lying, flat, humid and foggy lands of the lower valley sections and the coastal plains, thus compensating for the loss of vineyard land. The so-called 'cerealization' of Marche agriculture in the 15th and 16th century AD therefore did not mean the end of substantial viticulture *tout court*, but it did involve a reduction in intensive vineyard culture and a corresponding expansion of extensive forms.[70]

The question is, if a similar process may have occurred in Early and High Imperial central-Adriatic Italy. Obvious consequences of such a shift in viticulture practices would have been changes in yield and quality. Indeed, comparative evidence from the Marche region in the 19th century AD shows that grape vine plantations organized in the form of an '*alberata*' yielded about 1/10 the quantity of wine usually obtained from a vineyard proper.[71] When applied to Columella's minimum estimate of 21 hl, this would give yields of merely 2.1 hl/ha. In that case 52 to 90 % of the towns' territories would have been required

road margins and along smaller tracts; and the '*coltura promiscua*', whereby vines were cultivated on arable or pasture land (Vernelli (2003; 2008)).

70 Paci (2003).

71 *Atti Inch. Agr.* (1884, 723, 750).

FIGURE 13.12 *Abandoned alberata-field in the middle Potenza valley near San Severino Marche*

to satisfy the demand for wine of a population of c. 60,000 individuals, the estimated population of the valley in the High Imperial period. While this will not have ended the existing commercial wine trade, surpluses are bound to have become smaller, and moreover a substantial part of it was undoubtedly traded to the valley towns, often in perishable containers. The process may also have changed the nature of the wine trade. In fact, the appearance of a distinctive nomenclature for wine in textual sources during the time of Augustus and the 1st century AD indicates that from the Early Imperial period onwards Picenum apparently produced some famous quality wines that were especially popular overseas.[72] In this context Pliny's statement that such wines were best made from grapes from vines trained on trees in an *arbustum* (*NH*, XVII, 3; 5) is revealing.[73] Of course we cannot be certain, but the accounts of viticulture by Columella and Pliny do suggest that the *vinea* and *arbustum* systems coexisted in Imperial Italy, and that the latter in particular was probably widespread at the time. Both authors provide detailed planting instructions and elaborate on

72 For a discussion and references, see Cristofori (2004); Van Limbergen (2011).

73 It is important to remember here that some of the modern Italian quality wines, such as the Chianti or the Brunello di Montalcino, actually have their roots in the *alberata*; see Braconi (2008a, 79).

the most suitable grape varieties and the preferred types of trees for supporting the grape vines.[74] The literary evidence also suggests that farmers began to perfect the *arbustum* in the Augustan period and that this process continued throughout the 1st century AD.[75] Just as in the 15th and 16th-century Marche, the expansion of the *arbustum* system may well have been triggered by a growing demand for grain in central-Adriatic Italy, often at the expense of vineyards in the lower and most fertile parts of the valleys.[76]

5 Conclusion

In this chapter we have explored the diachronic relationship between extra-regional export, intra-regional consumption and viticulture traditions in the central-Marche Potenza valley and in central-Adriatic Italy in general between the Late Republic and Early Empire. While many elements are still speculative, by presenting the preliminary results we hope to stimulate a debate on the fundamental modifications that shaped Italian viticulture and agriculture in this period. If our calculations and hypotheses approximate the actual situation in the Potenza valley, it is unlikely that large quantities of wine could still be exported annually to external markets in the 1st and 2nd century AD. We argue that it was this increased internal demand—and not merely the disappearance of the provincial markets—that may have been behind the dwindling of central-Adriatic amphora exports in the High Imperial period. It was not a crisis in viticulture as such, but rather a transformation driven by local demographic evolution.

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74 See *supra*, notes 62 and 63.

75 Varro already discussed the practice of arranging the trees in an *arbustum* in so-called 'quincunxes', a regular, triangular formation which made it possible to achieve higher yields and better quality for both wine and grain (Varro, *Rust.* I, 7). Cicero (Cat. *M.* 59, 14) and Pliny (*NH*, XVII, 15, 78) also mention the method. This type of arrangement was actually quite common in the 19th and 20th century in the Marche and Umbria in the denser '*alberata*' plantations (Desplanques (1959, 37)). Pliny (*NH*, XVII, 35, 202) and Columella (*RR*, V, VII, 3) both also provide specific instructions on tree planting distances in an *arbustum* when combined with cereal cultivation.

76 It was probably no coincidence that Columella at this time complained that vineyard viticulture had declined (*RR*, III, 3, 4–6). Likewise, Domitian's grape vine edict (Suet., *Dom.* 7) may have been influenced by a grain shortage in Italy rather than by provincial viticulture competition (Purcell (1985)).

CHAPTER 14

From Surface Find to Consumption Trend: A Ceramic Perspective on the Economic History of the Pontine Region (Lazio, Central Italy) in the Roman Period

Gijs Tol

1 Introduction

Recent years have seen an increase in the use of quantified pottery data as an instrument for the study of the economic history of (parts of) the Roman world.[1] A quick survey of the available literature indicates that pottery data collected in field surveys have so far contributed little to these studies.[2] Survey archaeology itself is largely to blame here. Even though pottery—especially the widespread and durable pottery of the Roman period—can be considered the most important and reliable material source for identifying scale and directions of trade through time, many landscape archaeological projects still use it only to date sites and refrain from a more comprehensive study and full publication of the material evidence. This is unfortunate, as field survey data—when collected in a systematic and intensive manner—can serve as an important indicator for the presence and development of systems of supply and exchange on a local, regional and supra-regional scale.

In this chapter I explore the potential of utilising quantified pottery data collected in systematic and intensive field surveys to study the economic history of the Pontine region (Lazio, Central Italy), using the comprehensive site and pottery database of the long-running Pontine Region Project of the Groningen Institute of Archaeology (University of Groningen). As the following analyses use only a selection of the available data (both in terms of sites and finds), the results must be read with caution. They serve merely to illustrate the analytical potential of large regional data sets.

1 Recent examples include Rice (2011) and Vaccaro (2011).

2 Exceptions include Fontana (2008) and the well-known charts on the distribution of ARS in various parts of the Empire (Fentress and Perkins (1988); Fentress et al. (2004)). See also De Haas et al. (2011).

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2 Background

The Pontine region, situated approximately 60 km south of Rome, consists of a large coastal plain bounded to the north and east by the Alban hills and the limestone slopes of the Lepine mountains, respectively (Fig. 14.1). Since the mid-1980s the Groningen Institute of Archaeology has been conducting field surveys in this area in the context of the Pontine Region Project (henceforth PRP). Originally set up to provide a context for the excavations at the ancient site of Satricum,[3] these surveys over the last thirty years have investigated c. 30 km^2 of terrain across the region using systematic and intensive methods, while passing through several sub-phases, each with a different geographical, thematic and/or chronological focus.[4] Until recently, data acquired during each sub-stage of the project were stored into separate databases, thus impeding the comparison and integration of acquired data on a regional level. In order to overcome this obstacle, a new initiative will attempt to merge all separate databases into one comprehensive PRP database.

In this article I will use this comprehensive database—at the moment still under construction—to approach the economic history of the Pontine region on three different analytical levels, based on (variations in) the distribution of two common classes of pottery, table wares and amphorae, between 400 BC and AD 700. Firstly, I will provide an overview of their distribution on a regional level, lumping data for five different case study areas throughout the region. Hereafter I will compare fluctuations in amphora and table ware consumption in conjunction with settlement data from these five different areas, in order to gain insight into the (changing) degree of economic integration of each area. Thirdly, I will assess the distribution of a number of individual amphora types within the region, as an additional indicator for local variations in demand and supply.

3 Case Studies

The case study areas discussed here have been selected for both practical and substantive reasons: first, their geographical settings vary; second, they were all investigated during the most recent phases of the PRP, using comparable

3 Key publications for *Satricum* are Maaskant-Kleibrink (1987 and 1992); Gnade (2002 and 2007).

4 Major publications generated by the project include Attema (1993); Attema et al. (2010); Attema et al. (2011); De Haas (2011) and Tol (2012).

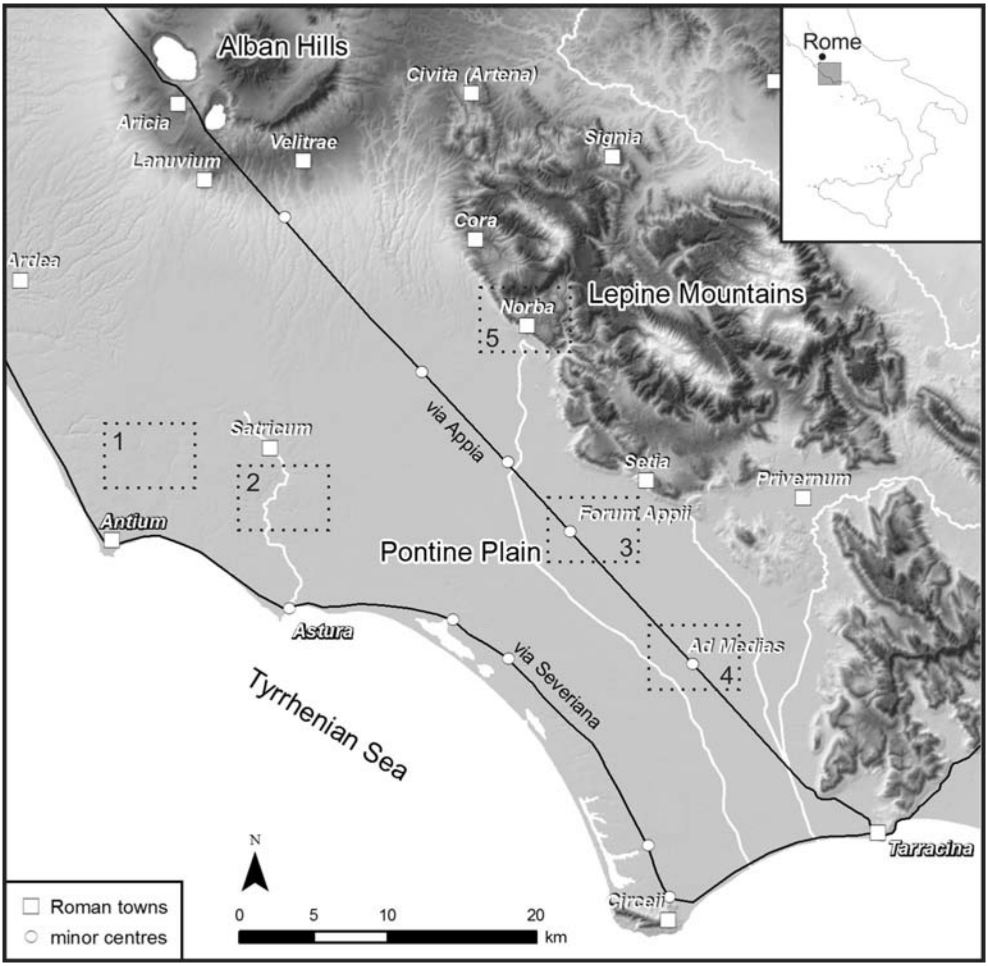

FIGURE 14.1 *The location of the Pontine region and the five case study areas discussed* (*map by Tymon de Haas*)

survey and sampling strategies; and third, these investigations included comprehensive studies and publication of the collected materials. Moreover, all the primary data generated by these surveys have already been transferred to the overarching project database. The five case studies discussed are (Fig. 14.1):

1) *The Nettuno area*: Surveys in the north-eastern part of the *ager* of Antium were conducted in 2004–2005, followed by systematic revisits to all mapped locations in 2006–2007.[5]

5 The results of these surveys were published in a report (Attema, De Haas and Tol (2010))

2) *The Astura area*: South of Satricum, along the lower streambed of the Astura River, work carried out in 2003 comprised both systematic surveys and revisits to locations mapped during a topographical inventory of the area in the 1970s. All mapped locations were studied and sampled again in 2006–2007.[6]
3) *Forum Appii*: The road station of Forum Appii is situated in the interior along the Via Appia at the start of the Decennovium canal, which provides a direct connection with the Roman harbour town of Tarracina. The site is currently being studied in the context of the PRP in an integrated programme of non-invasive methods (intensive on-site field surveys and geophysical prospection).[7]
4) *The central part of the lower Pontine plain*: This area centres on the ancient road station of Ad Medias (modern Mesa di Pontinia), situated along the Via Appia in the lowest part of the Pontine plain. The area is currently being studied in the context of the Pontine Region Project through intensive on-site surveys and geophysical prospections at Ad Medias itself, and extensive surveys in the surrounding area. An area slightly more to the north was studied in 2006–2007.[8]
5) *The Norba area*: The area around the Roman colony of Norba, situated in the foothills of the Lepine mountain range, has been studied by the PRP on several occasions between 1989 and 2008.[9]

The project database currently contains information on c. 600 sites and over 190,000 fragments of pottery, including c. 17,000 'diagnostic' fragments (generally rims, bases, handles and decorated body fragments). Both amphora and table ware fragments are well represented in the database (13,709 amphora fragments including 2376 diagnostic ones; and 5858 fragments of table ware of which 2306 are diagnostic). Together, the five case-study areas discussed here account for almost 70 % of all diagnostic amphora and table ware fragments

and synthesized in Attema et al. (2009) and (2011). For the systematic revisits see Tol (2012, Chapter 3).

6 For the results of these surveys see Attema et al. (2008). For the systematic revisits see Tol (2012, Chapter 3).

7 For an overview and preliminary results of the Minor Centres Project see Tol et al. (2014) and De Haas et al. (forthcoming). For earlier work at the site see Bruckner (1995).

8 For the most recent work see publications mentioned in Note 7; for the earlier surveys De Haas (2011).

9 Attema (1993); Van Leusen (1998); De Haas (2011); De Haas et al. (2012).

so far entered into the database.[10] Although the number of fragments available in each individual case study area varies considerably, in our view the data set is sufficiently robust to allow the reconstruction of meaningful patterns of supply and consumption.[11] All pottery data presented in this chapter were quantified using weighed averages,[12] and charts were constructed using rim fragments only, because of the considerable variation in the diagnosticity of other vessels parts (such as bodies, handles and spikes) of both classes of pottery.

4 The Regional View

Amphorae[13]

Amphorae—ceramic containers used throughout the Roman period for medium and long-distance transport of a wide variety of goods, mainly wine, olive oil and fish sauces—were generally transported as primary cargo and are therefore considered primary indicators when reconstructing ancient trade patterns.[14]

Based on the available data (Figs. 14.2 and 14.3) the supply of amphora-packed commodities to rural areas of the Pontine region did not commence until the second half of the 4th or 3rd century BC, and even then only in relatively small numbers. In this early phase the most commonly attested types are early variants of the wine-carrying Graeco-Italic amphora (many of Campanian manufacture),[15] although as early as the late 3rd century BC some spec-

10 Values for individual wares vary from 66% (terra sigillata) to 74% (black gloss ware).

11 An earlier attempt to use ceramic data derived from PRP data as a proxy for economic development, although relying on a statistically much less robust sample, was published some years ago (De Haas et al. (2011)).

12 For the application of weighed averages see e.g. Fentress and Perkins (1988) and Fentress et al. (2004). Although I am aware that the use of this quantitative method is far from free of bias, in my opinion it is the most suitable and straightforward method when dealing with surface assemblages. For alternative visualization methods see for example Orton and Orton (1975); Millett (1991); Van de Weghe et al. (2007) and Poblome et al. (2012).

13 The applied date ranges derive from the University of Southampton Amphora Project database (http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/), supplemented by Bonifay (2004) for a number of African types.

14 For overviews of shipwrecks carrying amphorae see Parker (1992), as well as Olcese (2012).

15 For the typical 'black sand' fabric of these amphorae of Campanian origin, see Peacock and Williams (1986, 87).

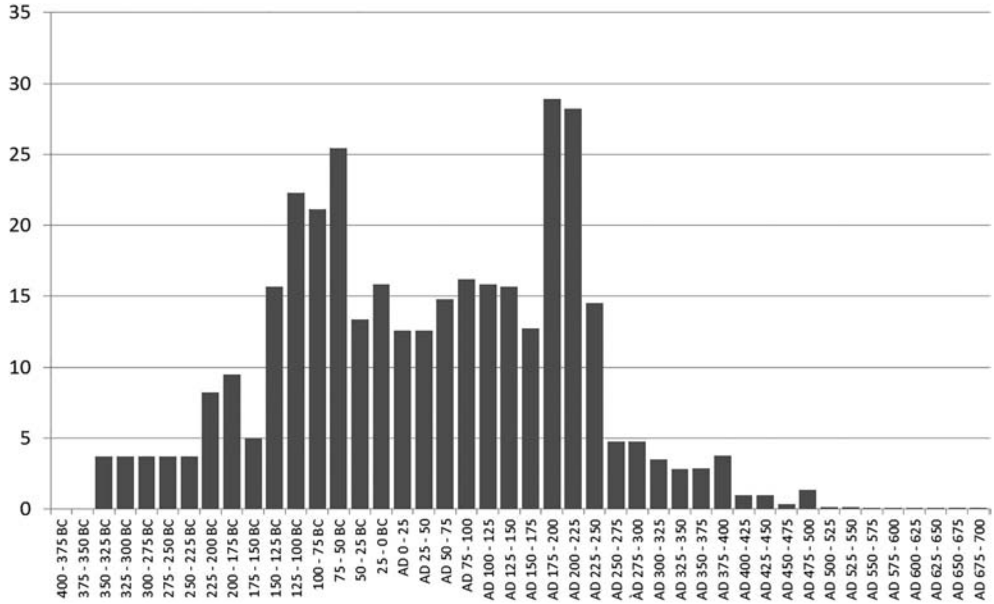

FIGURE 14.2 *Cumulative trend of all dated amphora rims in the five case studies combined (N = 352)*

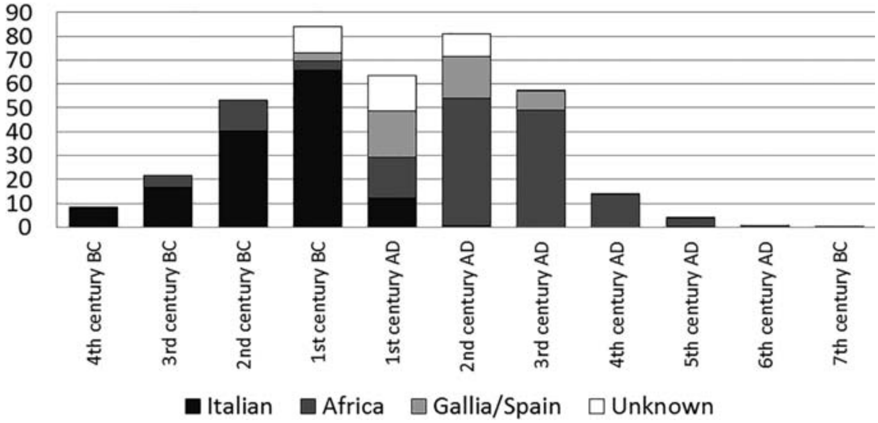

FIGURE 14.3 *Cumulative trend of all dated amphora rims in the five case studies combined, by area of provenance (N = 352)*

imens of North African origin reach the Pontine region. This modest volume of amphorae used in the mid-Republican period and before is a phenomenon typical of the Roman *suburbium* and one often regarded as reflecting a heavy reliance on locally made wines that were transported in archaeologically less visible containers, such as barrels or bags.[16] The occurrence of early and middle Republican amphorae in urban (mainly burial) contexts (e.g. Satricum) as well as a general absence of pottery associated with wine drinking on rural sites before the middle Republican period (see below) could also mean that wine consumption in this period was a somewhat restricted and predominantly urban phenomenon, at least in the Pontine region.[17]

From the second half of the 2nd century BC onwards the number of amphorae rose markedly, implying a growing supply which reached an initial peak in the first half of the 1st century BC. This peak was mainly linked to the introduction of the Dressel 1 amphora, a type that is abundant throughout the region. Again, many of the attested specimens were imported (for example from the Bay of Naples), but some degree of local amphora production must also be reckoned with. A workshop involved in the production of late Graeco-Italic and Dressel 1A amphorae was identified at the coastal villa of Le Grottacce; however, amphorae produced there have rarely been encountered in the interior and are therefore more likely to have been intended for maritime commerce.[18] Another major amphora production area of this period was identified just east of the Pontine region, near Fondi. It was active between the late 3rd century BC and the early Imperial period.[19]

16 See for example Volpe (2009); Olcese (2009, 146) and Purcell (1995). For the use of barrels and bags in the transportation of foodstuffs in general: Ejstrud (2005) and Wilson (2009c).

17 Gnade (2002; 2009 and 2011).

18 On the Le Grottacce workshop: Attema et al. (2003); De Haas et al. (2008), as well as Hesnard et al. (1989); Ricq et al. (1989); Empereur and Hesnard (1987) and Attema et al. (2012). No amphorae from Le Grottacce, for example, were recorded during field surveys in the *ager Portuensis* (Olcese and Thierrin-Michael (2009)). We thank Prof. Gerald Finkielsztejn for alerting us to two amphorae identified as possibly having been produced at Le Grottacce: the first was recently recorded at Maresha (Israel), whereas the second specimen is in the Graeco-Roman museum at Alexandria (Finkielsztejn, personal comment).

19 Olcese (2012, 134–137 with references). The three different workshops identified so far produced Graeco-Italic, Dressel 1 (various variants) and Dressel 2–4 amphorae. In addition, the current phase of the PRP has produced limited evidence for local amphora production at both Forum Appii and Ad Medias, in the form of a handful of waster fragments. While these were found scattered across the site at Ad Medias, at Forum Appii they were recorded within the area of a larger industrial quarter, a short distance north-

Following a drop in the third quarter of the 1st century BC, consumption levels remained relatively stable until the second half of the 2nd century AD, when an overall (and short-lived) peak is recorded. This time span coincided with the maximum diversity of imports to the region, with different amphora types from Spain and Gaul and especially Northern Africa being present in substantial numbers. The same period saw an almost complete cessation in the number of amphorae of Italian origin. From the mid-3rd century AD onwards the number of amphorae—by this time almost exclusively consisting of African olive oil containers—dropped considerably, followed by an even more dramatic decline in the third quarter of the same century. After this date, amphora numbers in the region remained low, and the supply seems to have dried up altogether by the mid-6th century AD.[20]

Table Wares[21]

The table wares found in the Pontine region attest to three main successive productions: Republican black gloss ware, early Imperial terra sigillata and African Red Slip ware (ARS) (Fig. 14.4). Such table wares are generally considered to have been secondary cargo, supplementing other goods. Likely as that may be

east of the main built-up part of the settlement. This industrial zone, which was active in the late Republican period, was mainly involved in the production of building materials (Tol et al. (2014)); it also yielded a number of clearly over-fired coarse-ware fragments.

20 It must be noted that incidental handle fragments from eastern Mediterranean amphora types were observed (e.g. Rhodian type and Kapitän-2). From the late Roman period onwards a considerable presence of smaller amphorae, which in a fragmentary state are easily confused with other shapes, is not to be expected. So far, their presence is almost exclusively confined to the late Roman coastal settlement of Astura (Tol (2012, Chapter 6); Tol and Attema (2014)).

21 The following charts are based exclusively on typologically dated rim fragments of black gloss ware, terra sigillata and African Red Slip wares. The diagnosticity of other vessel parts in these three main categories of table ware varies considerably; stamps, for example, are common on both black gloss ware and terra sigillata and can often be accurately dated. On the other hand, ARS shapes were not regularly stamped until the 4th century AD, so that earlier body and base fragments can only be dated approximately and with wide margins. Dates used in the construction of this chart are based on Morel (1981) for black gloss ware (incorporating additions by Stanco (2009)); Ettlinger et al. (1990) for terra sigillata, and Bonifay (2004) (supplemented by data published earlier, mainly Hayes (1972) and *Atlante* I (1981) for ARS. The ARS trend does not include fragments of so-called 'African cooking ware', which were included in Hayes' famous typology (e.g. Hayes forms 23, 196 and 197).

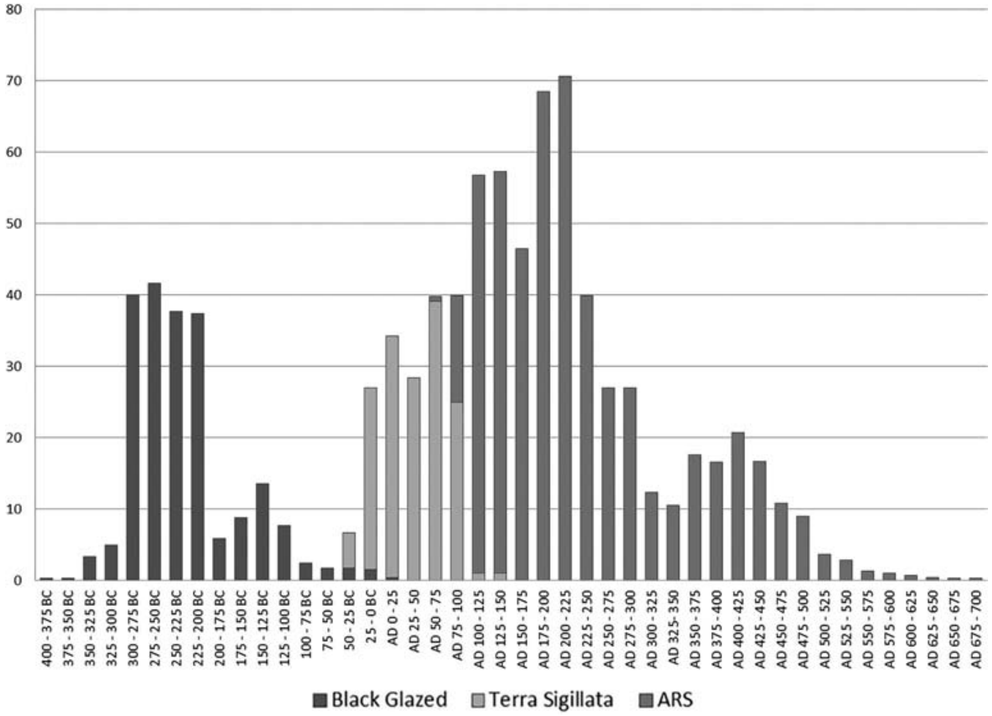

FIGURE 14.4 *Cumulative trend of all dated table ware rims in the five case studies combined (N = 908)*

for the African products, the supply of black gloss ware and terra sigillata to our study area must have encompassed a range of geographical scales and volumes, as well as different transport and marketing mechanisms.[22]

The consumption of black gloss ware took off somewhere in the 4th century BC, reaching a significant volume already by the 3rd century BC. This coincided with the heyday of the Central Italian *Gruppo dei Piccoli Stampigli* (GPS).[23] GPS production sites are scattered north and south of Rome; indirect indicators for production (kiln spacers and misfired fragments) occur on at least one site in the Pontine region, close to the Roman colony of Antium.[24] After the 3rd century BC[25] black gloss ware consumption levels in the Pontine area greatly

22 Di Giuseppe (2012) discusses various potential supply mechanism for black gloss ware. See Vaccaro et al. (this volume), and Kiiskinen (2013) for distribution mechanisms of terra sigillata.

23 Morel (1969 and 1981); Perez Ballester (1987); Stanco (2009); Di Giuseppe (2012).

24 Tol (2012, Chapter 5); Tol and De Haas (2013, 151–152).

25 However, it is not unthinkable that local production continued at least into the late 3rd or

declined and throughout the 2nd and 1st centuries BC remained low, with the exception of a small peak between 150 and 125 BC. This general phenomenon, also observed in other parts of the Roman *suburbium*, coincided with the cessation of large-scale Central Italian production in the course of the 3rd century BC and a simultaneous increase in the production of black gloss ware elsewhere in Tyrrhenian Central Italy (mainly Campania and Etruria).[26] It has often been argued that these productions represent a more industrial mode of manufacture, one based on slave-run estates and catering predominantly to export markets. This would explain the relatively strong presence of these products at major trade centres such as harbour towns, accompanied by a much more limited penetration towards the interior.[27]

Terra sigillata was introduced in the Pontine region during the 3rd quarter of the 1st century BC, but consumption did not stabilize at a high level until the 1st century AD. This observation tallies with evidence from stamped fragments, which points to a dominance of products by Pisa workshops over those from Arezzo, the principal centre of early terra sigillata production.[28]

ARS began to replace terra sigillata as the dominant fine ware in the late 1st century AD and peaked from the start of the 2nd century AD onwards, particularly between AD 175 to c. 225, after which consumption drops steeply until the mid-4th century AD. After a slight recovery between AD 350 and 450 the consumption of ARS gradually faded out, and by the late 6th or early 7th century AD no more ARS reached the Pontine region.

5 Intra-Regional Differentiation

These two regional trends allow us to evaluate fluctuations in the supply of amphora-packed commodities and table wares to the Pontine region. At the same time, such an aggregate trend may mask considerable dissimilarities in the consumption of these types of pottery in different parts of the region. Trends in amphora and table ware consumption will therefore be assessed in conjunction with the available settlement data, in order to gain insight into the level of economic integration in each of the five study areas separately. One

even the early 2nd century BC, as is for example suggested by a presumed production site below Norba (Attema (1993, Site 10952); Tol and De Haas (2013, 152)).

26 The same trend was recorded during the Tiber Valley Project (Di Giuseppe (2008)) and the *Suburbium* project (Capanna and Carafa (2009)).

27 Morel (1981); Di Giuseppe (2012).

28 OCK (2000, 37).

TABLE 14.1 *Number of amphora fragments and types in each of the five case studies*

Area	N_fr	N_ types	Italian (%)	African (%)	Gallic/ Iberian (%)	Unknown (%)
Nettuno	95	25	34,7	30,5	25,2	9,5
Astura	33	17	54,5	27,3	6,0	12,1
Forum Appii	140	35	17,2	59,5	10,9	12,2
Pontine plain	67	19	71,6	16,4	4,5	7,5
Norba	17	10	58,8	35,3	–	5,9
Total	**352**	**48**	**38,1**	**39,2**	**12,5**	**10,2**

TABLE 14.2 *Number of table ware fragments and types in each of the five case studies*

Area	N_fr total	BG (N_fr)	TS (N_fr)	ARS (N_fr)
Nettuno	307	21	53	233
Astura	122	6	16	100
Forum Appii	251	31	70	150
Pontine plain	151	117	16	18
Norba	77	36	3	38
Total	**908**	**211**	**158**	**539**

cautionary note, however: the overall number of available fragments as well as the number of fragments from individual pottery types vary considerably in different parts of the region, reflecting differences in research intensity, local settlement histories and access to imported commodities (Tables 14.1 and 14.2), as well as possible differences in their role within the overall supply chain (for example, pure consumption areas *versus* areas involved in the large-scale redistribution of commodities).

The Nettuno Area (Fig. 14.5)

Surveys around Nettuno have yielded evidence for a steady increase in the number of settled sites throughout the Republican period, with a peak in the early Imperial period. The same period saw intensive building activity at the nearby town of Antium, including improvements to the local infrastructure:

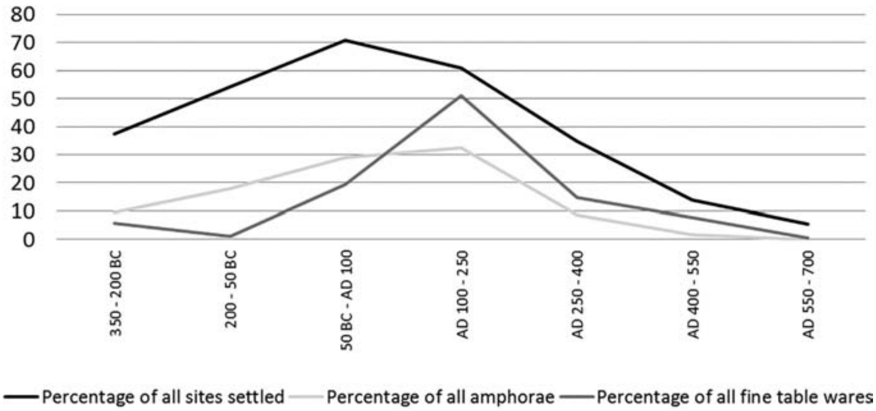

FIGURE 14.5 *Settlement development and pottery consumption in the Nettuno area*

the city was equipped with a harbour during the reign of Nero, and a probably pre-existing track connecting the town with the Via Appia was paved over in this period (the so-called *Via Selciatella*).[29] After a minor decrease in the relative number of settled sites in the mid-Imperial period, a more substantial decline set in from the late Imperial period onwards. Only some of the large villa complexes directly along the *Via Selciatella* remained occupied until the early Middle Ages.

Amphora consumption in this area broadly followed settlement trends. The number of amphorae increased gradually to a maximum in the early and especially the mid-Imperial period (slightly later than the peak in the number of settled sites). Recovered fragments attest to a considerable variation in type and provenance in this period, reflecting the importance of the newly constructed harbour at Antium. Compared to other parts of the region, the decline in amphora consumption after the mid-Imperial period was much more gradual and the area continued to be supplied with amphora-packed commodities until at least the 5th century AD.

Black gloss ware is found only in small quantities and largely dates to the middle Republican period.[30] Table ware consumption increased considerably from the early Imperial period onwards to a maximum in the mid-Imperial

29 For an overview see De Haas et al. (2011). For the *Via Selciatella* (its ancient name remains unknown) see De Rossi (1981); Negrini (2004); Garofalo (2007).

30 Production of mid-Republican black gloss ware in the Etrusco-Latial tradition is postulated at/near one site in the study area based on the discovery of a kiln spacer and a number of possibly over-fired fragments (Tol (2012, 233–237); Tol and De Haas (2013, 151–152)).

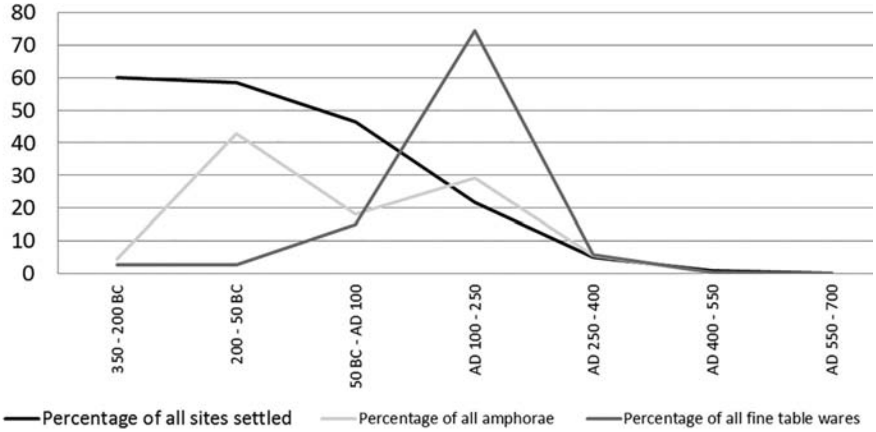

FIGURE 14.6 *Settlement development and pottery consumption in the Astura area*

period. Fragments from these periods are especially abundant at several large villa sites along the main roads in the area. After that, consumption levels sharply and steadily declined, although much less dramatically than elsewhere in the Pontine region.

The Astura Area (*Fig. 14.6*)

Rural settlement along the lower Astura river valley reached a maximum in the middle and late Republican periods, when approximately 60% of all identified sites were occupied. A slight decline in the number of settled sites in the early Imperial period was followed by a more marked decrease in following phases; only one site continued to be occupied into the 5th century AD.

As in the lower Pontine plain and around Norba, highest consumption levels of amphorae in the Astura area were reached in the late Republican period. However, after a marked decline in the early Imperial period numbers settled at a second, more modest peak in the mid-Imperial period. Although the consumption of amphora-packed products was relatively low, the range of represented types is similar to that around nearby Nettuno, suggesting that the sites in the Astura area tapped into the same trade networks, and as such may have benefitted equally from the construction of the harbour of Antium. In line with the observed general decline in the number of settled sites, only a few late Imperial and late antique amphorae were recovered.

Black gloss ware does occur in small amounts on sites in the Astura area but includes very few diagnostic fragments. This may be partially explained as a result of the large-scale destruction of archaeological sites by modern agriculture in this area, whereby sites are often reduced to non-diagnostic

scatters of mainly comparatively robust tile fragments. On the other hand, the scarcity of black gloss ware fragments could mean that most recorded sites actually date to the late Republican period, when overall few table wares appear to have reached the Pontine region. Contrary to the rural settlement trend, consumption rates of table wares increased substantially in the early Imperial period and achieved an absolute peak in the mid-Imperial period, possibly a reflection of favourable connections with Antium. Only a handful of ARS fragments date after the mid-Imperial period, reflecting the large-scale abandonment of the area.

Forum Appii (*Fig. 14.7*)

The site of Forum Appii may have been established in the late 4th/early 3rd century BC. It apparently reached its maximum extension by the late Republican/early Imperial period, when it covered c. 12 ha and probably possessed a river harbour.[31] After its heyday the settlement progressively contracted, although some parts of it yielded evidence for continuous occupation until at least the early 6th century AD.[32]

The earliest amphorae reaching Forum Appii probably date to the second half of the 3rd century BC. From then on supply levels gradually increased to a maximum in the mid-Imperial period, marked by considerable variation in type and provenance, with olive oil containers from Northern Africa in particularly being common. The subsequent late Imperial period witnessed a substantial decline and the consumption of amphora-packed commodities diminished, until fading out completely around the middle of the 6th century AD.

Table ware consumption in the area was rather modest in the mid-Republican period and extremely low during the late Republican period. From the early Imperial period onwards, table ware consumption around Forum Appii differed significantly from that in the other studied areas. A peak is reached already in the early Imperial period (instead of the mid-Imperial period), and only a third of all ARS fragments date to the mid-Imperial period (elsewhere

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31 This is suggested by the presence of possible storage facilities and quays mapped by geophysical prospecting in the southern part of the site along the Decennovium canal (Tol et al. (2014)), and by the earlier discovery of an embankment wall opposite this location (identified by Lugli and mentioned by Cancellieri (1987) and Bruckner (1995)). The presence of harbour facilities is also suggested by Horace, who in Satires I, 5 describes a boat trip from Forum Appii to the harbour town of Terracina.

32 At the moment the abandonment of the site is difficult to date, depending the outcome of a study of the large quantity of glazed pottery recovered from the site.

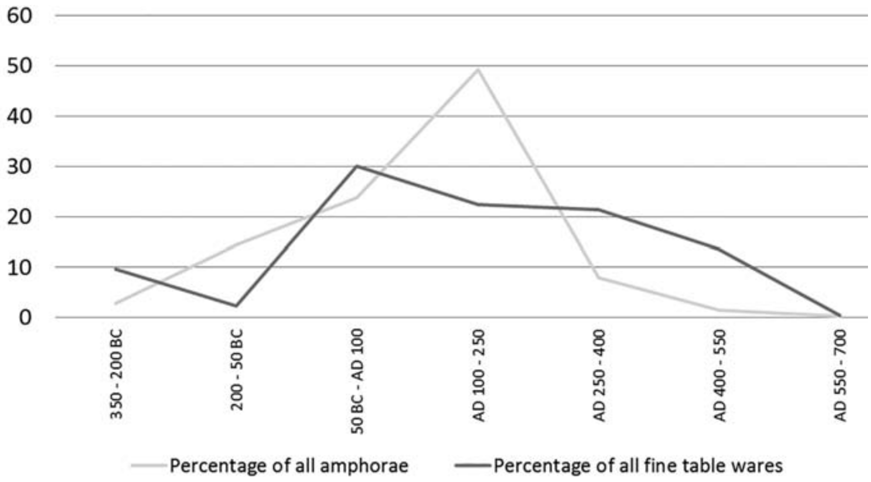

FIGURE 14.7 *Pottery consumption at Forum Appii*

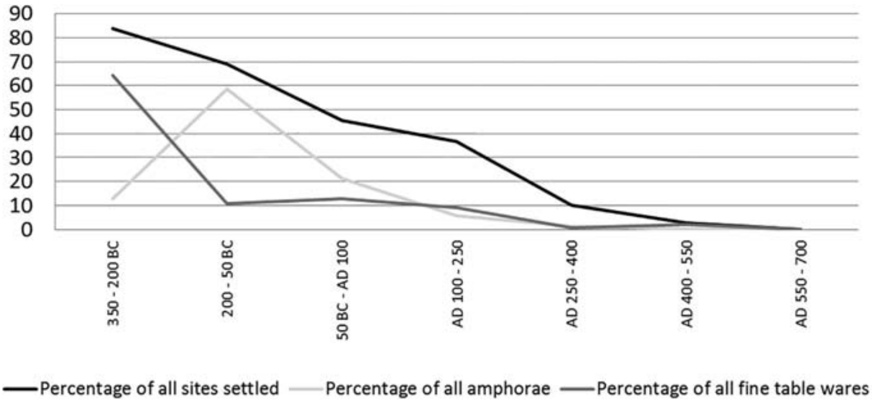

FIGURE 14.8 *Settlement development and pottery consumption in the lower Pontine plain*

this is 65% to 90%). Supply levels of this ware remain stable throughout the late Roman period, and ARS continued to be consumed, albeit in much smaller quantities, until at least the late 6th or early 7th century AD. This much more stable trend probably reflects the site's function as a redistribution centre.

The Lower Pontine Plain (*Fig. 14.8*)

Settlement in the lower Pontine plain reached a maximum in the mid-Republican period, when almost 85% of all sites were occupied. This roughly coincided with the construction of the Via Appia and the foundation of a number of road stations along its course, including the sites of Forum Appii and

Ad Medias. Subsequent periods witnessed a gradual and continuous decline in the number of occupied sites, leaving most rural sites abandoned already in the course of the Republican period. Only a few, mostly those closest to the Via Appia, persisted into the Imperial period.

Amphora consumption levels were low until the 2nd century BC but by the late Republican period had greatly increased. In subsequent periods amphora consumption gradually decreased, more or less in line with rural settlement trends. No amphorae appear to have reached the area after the 4th century AD.

Rural surveys around Ad Medias recovered a large number of black gloss ware fragments, most of which can be assigned to the middle Republican period.[33] A dramatic drop in table ware consumption is observable in the late Republican period. Afterwards, consumption rates remained low, although the average number of fragments recorded per site is slightly higher. A handful of ARS fragments, found exclusively at sites situated directly along the Appia, show that this ware incidentally still reached the lower Pontine plain until the 4th and 5th centuries AD.

The Norba Area (*Fig. 14.9*)

Field walking in the foothills below Norba documented a densely settled mid to late Republican rural landscape, with more than 70% of all identified sites being occupied in these periods. After that, a pronounced and persistent decline set in, leaving only a few rural sites still occupied by the late Roman and early medieval period. The fate of the city of Norba appears to mirror this trend; it flourished in the middle and late Republican period, but was never rebuilt after its destruction during the Social War.[34]

Overall, few amphora fragments were found on rural sites around Norba. In line with the evolution of rural settlement amphora consumption reached its highest level in the late Republican period, after which it rapidly declined, at an even higher rate than the relative number of settled sites decreased. No amphorae are attested after the 3rd century AD.

Overall, rural sites in the Norba area yielded few fragments of fine wares. The majority of the black gloss ware fragments are of mid-Republican date; the number of attested fragments from the periods that followed decreased significantly, in spite of a recorded peak in rural settlement. The decline is even more marked in view of the fact that the fragments dated to this time span were

33 The dominance of mid-Republican black gloss ware is further corroborated by ample evidence from stamps that were part of the *Gruppo dei Piccoli Stampigli* repertoire.

34 Hofmann (1956, 1178: referring to Appian, *Bell. Civ.* I: 94).

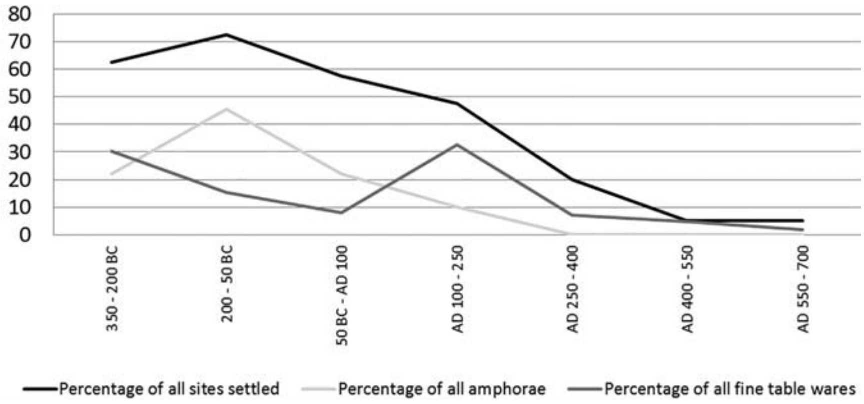

FIGURE 14.9 *Settlement development and pottery consumption in the Norba area*

largely restricted to a single site that may have been involved in black gloss ware production.[35] The almost complete absence of early Imperial terra sigillata is remarkable and may be a result of the abandonment of the town of Norba as a local (re)distribution centre. A sharp rise in the consumption of ARS in the mid-Imperial period was followed by a marked decrease in the subsequent late Imperial period. Hereafter a few ARS fragments prove that the ware incidentally still reached the area until the early medieval period.

6 Type and Provenance Differentiation

Following the discussion of the settlement and ceramic consumption trends in each of the five case study areas, the next section will briefly illustrate how additional information on local differences in economic development may be obtained by zooming in on the specific types that account for each trend.

As an example of the potential of this approach we here present a comparison of amphorae attested in the Nettuno area and at Forum Appii during the first two centuries AD, when both areas saw a peak in the consumption of amphora-packed commodities (Figs. 14.10a/b and 14.11). In the Nettuno area

35 Attema (1993, site 24); Tol and De Haas (2013, 152); De Haas et al. (2012, 241). The site is situated on the Lepine foot slopes, c. 3 km south-east of Norba. During a first visit to the site in 1988 kiln debris was observed, and the sample collected on that occasion included a fragment of a kiln spacer. The production of plates and bowls in black gloss ware as well as jugs and bowls in utilitarian wares is suggested, but needs to be confirmed by further study.

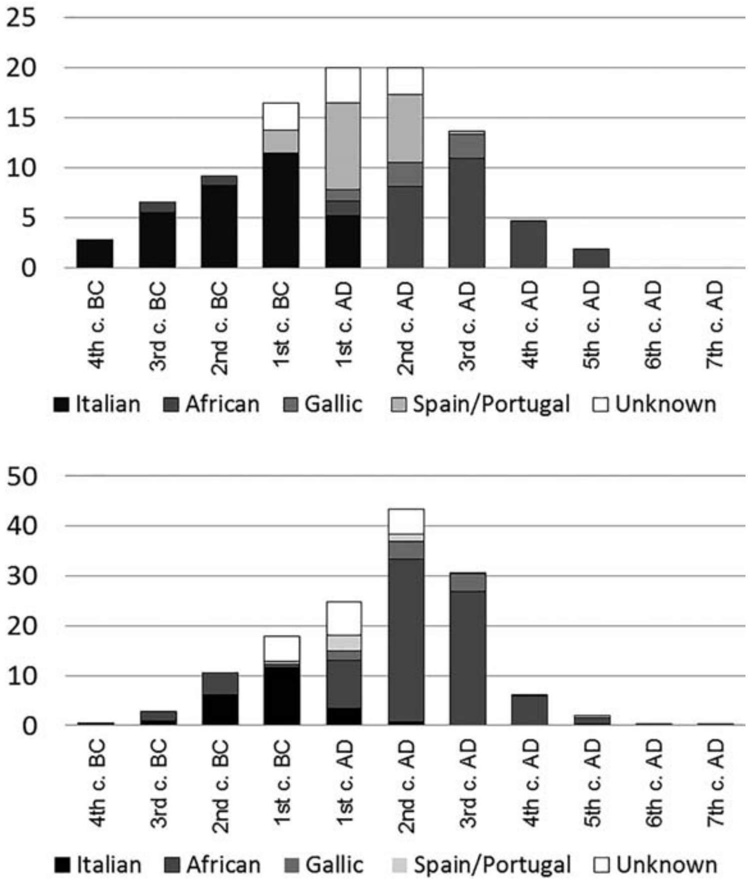

FIGURE 14.10A–B *Cumulative trend of all amphora rims by provenance in the Nettuno area (top) and at Forum Appii (bottom)*

the most common amphora type dating to this period is the Dressel 2–4 wine amphora (with both Italian and Catalan specimens being present in abundance), while the 2nd century AD was additionally characterized by the large-scale consumption of African olive oil. At the same time, only small numbers of Italian and Spanish wine amphorae were encountered at Forum Appii; the bulk of the amphorae in the first two centuries AD were North African olive oil and fish sauce containers (especially common are the Leptiminus 1 and Tripolitanian 1 types). The absence of evidence for the import of foreign wines at Forum Appii may suggest a greater reliance on locally produced wines, transported in other sorts of containers. It is very interesting in this regard that Forum Appii was well-connected to the Roman town of Setia, which in the Imperial period produced high-quality wines that were among the favourites of the emperor

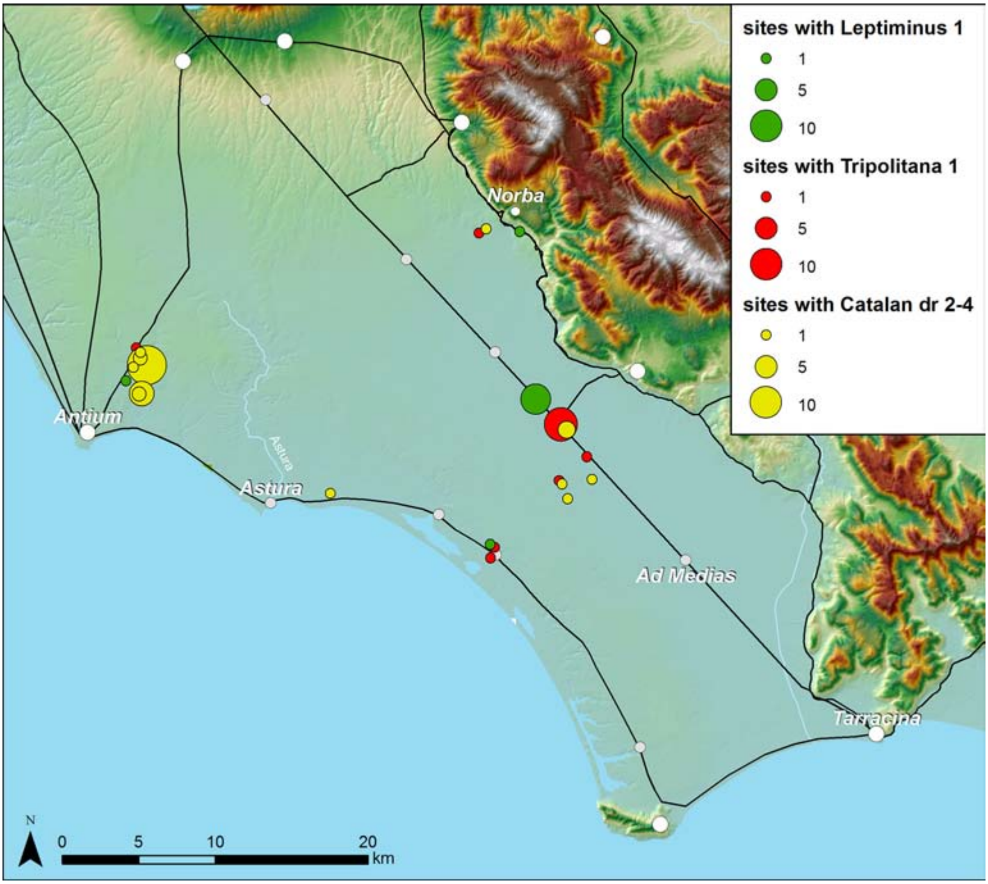

FIGURE 14.11 *Occurrence of Leptiminus 1, Tripolitanian 1 and Catalan Dressel 2–4 amphorae in the Pontine region (map by Tymon de Haas)*

Augustus and also received praise from various ancient authors like Martial, Juvenal and Pliny the Elder.[36] The production may have taken place at a number of estates in the wider area that have yielded direct (i.e. press beds) as well as secondary (i.e. production of wine-carrying amphorae) indicators for local wine production.[37] The presence of a river harbour at Forum Appii and its overall favourable position in the regional infrastructural network could mean that the site not only consumed these local wines, but that it also played a role in their further distribution.

36 Pliny *Nat.* 14.8; Martial 6.86 and 13.112; Juvenal 5.34.

37 De Haas et al. (2012); Attema et al. (2014). See also Zaccheo and Pasquali (1972).

7 Preliminary Observations and Future Perspectives

This section summarizes the main results of a first attempt to utilise the ceramic data generated by the PRP as a proxy for the study of the economic history of the Pontine region. In addition, it provides some suggestions for future applications of the same data set.

In this chapter the results of analyses carried out at different scales were examined. On a regional level it can be surmized that the supply of amphora-packed commodities to rural territories was minimal before the 3rd century BC, as well as after the 4th century AD, suggesting that rural settlements in the Pontine region which pre- and postdate this time span probably relied on local commodities that were transported in archaeologically less visible containers. The supply of table wares peaked for the first time in the middle Republican period, corresponding to the main phase of the Central-Italian black gloss ware production. A second, even higher peak was reached in the mid-Imperial period, instigated by the supply of large quantities of ARS to the region.

On an intra-regional level, and based on the study of amphorae and table ware fragments from five case-study areas within the region, we can observe a generally close relation between settlement development and fluctuations in the consumption of table wares and amphora-packed products. There are, however, a number of interesting exceptions to this rule, reflecting local and regional idiosyncrasies. All case study areas, for example, exhibit a significant reduction in the level of table ware consumption after the 3rd century BC, a reflection of the much more restricted inland penetration of late Republican black gloss ware. Another distinctive pattern is observable in the Nettuno and Astura areas and at the site of Forum Appii. Around Nettuno and Astura, sites attest to the consumption of a relatively wide range of ARS and amphora types in the early and mid-Imperial period. This cannot be viewed separately from the presence of harbour facilities at Antium, which facilitated access to products arriving from outside the region. The data from Forum Appii, on the other hand, indicating the presence of an abundance of types of different origin, illustrate the site's importance as a redistributive centre.

At the same time, the much rarer presence of such imported products in the Norba and Pontinia areas suggests that these sites occupied a much more marginal position in the overall supply chain.

Finally, a more detailed study of the consumption of amphora-packed commodities was performed, comparing data from the Nettuno area and Forum Appii during the first two centuries AD. Although much more work needs to be done to reach firm conclusions, a closer inspection of the superficially roughly

similar trends visible for these two case studies reveals that commerce may have adapted to local wants and needs, at least in this period.

As was mentioned in the introduction, the study presented in this article was mainly exploratory and served merely to illustrate the analytical potential of systematically collected regional data sets. In the near future the completion of the overarching PRP site and finds database will allow us to perform a similar exercise with more robust data whilst also enabling us to more thoroughly explore the factors responsible for the observed trends, for example by looking at import replacement by local production, or by assessing intra-regional variation in wealth and population (e.g. detailed assemblage analyses based on all collected materials; acquiring extra data on local site-typologies).[38]

Furthermore, we are currently exploring the possibility to add information from data sources other than PRP surveys in order to strengthen the analytical potential of our database. We believe that this integration will open up a wide range of interesting avenues, such as the study of town-country relations (by adding urban data), the reconstruction of specific economic networks (e.g. the brick and tile industry, using brick stamps)[39] and the study of regional social landscapes (by adding epigraphic data). Moreover, the incorporation of similarly extensive regional data sets (such as those compiled by the Tiber Valley Project and the Suburbium project)[40] will create the possibility to reconstruct distribution mechanisms and settlement developments on an inter-regional level.[41]

38 See for example Witcher (2006a).

39 Graham (2006).

40 For the Tiber Valley Project see Patterson and Millett (1998); Patterson (2004) and various contributions in Patterson and Coarelli (2008). For the Suburbium project see for example Capanna and Carafa (2009) and Carandini (2009).

41 For examples of an inter-regional approach to pottery distribution see for example Brughmans (2010) and Willet (2014).

CHAPTER 15

Wood and Charcoal for Rome: Towards an Understanding of Ancient Regional Fuel Economics

Robyn Veal

1 Introduction

Wood as a natural resource is an interesting ancient commodity. It was substantially part of the agricultural economy, since raw wood for timber would have been mostly grown in rural areas, as would have raw wood for fuel. It was also a significant part of the non-agricultural economy, since timber was used in so many trades, both directly (in carpentry to make furniture, and tools), and indirectly (for example, as formwork in building construction). Its greatest utility however was as fuel, both in its raw form and processed as charcoal. Wood and charcoal were the major energy sources that fuelled many trades such as iron smelting and smithing; pottery, brick and tile making; glass making; food production (especially industrial baking of bread in the Imperial period); firing baths; and making lime. Fuel was also consumed extensively in homes for cooking and heating, and for cremation (in periods where this was prevalent). These activities occurred both in rural areas and in cities in differing proportions. Different activities could require the use of raw wood or charcoal fuel, and this distinction is critical for understanding forest consumption and ultimately the forest and fuel economy. In fact, wood consumption for fuel production greatly dominates ancient forest economics, as shall be considered.

Wood production (for timber or fuel) is constrained by a number of factors, in particular ecological ones, perhaps more than most other resources. The physiological growth requirements of trees limit in the first instance, which types of trees may grow well in different locations. For timber the requirement for large trunks further constrains growth locations, especially in densely populated regions. The topography of the Italian peninsula is particularly useful in this matter, as it is distinctly zonal (coastal areas, plains, mountains, and raised mountain flats). Moreover, we now have more reliable data on the climate of the Roman period to assist us.[1] Besides the base ecological determinants, mar-

1 Studies utilizing a large variety of proxies show the climate in the Roman period was more sta-

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ket forces (supply, demand, and urbanization levels), and competition for land space (with food and other products, both animal and vegetable, and other activities, e.g. hunting) will have decided the nature of forest exploitation. Some land was not suitable for growing trees (or indeed other crops), these include very steep inclines and other places with little soil or rainfall. Archaeological evidence, (in particular carbonized wood remains), synthesized with archaeological and historical information, helps determine what types of wood have been identified in the archaeological record as fuel, and usefully (in some sites), what types of fuel are associated with particular activities. Evaluating potential supply zones, in comparison with fuel consumption points may lead to useful inferences about transport and marketing strategies. Potentially, cities in a region will compete with each other for fuel sources. Fuel, itself, will compete for transport space with other primary and secondary products supplied to urban areas. From these considerations, a view of whether a regional fuel economy is self-sufficient, or not, may be obtained. Published data suggests that Pompeii was supplied with wood fuel from considerable distances. I have inferred a substantial fuel economy from the 3rd century BC, supplied mostly from distant forests (Samnium and other parts), up until the eruption.[2] The results provide food for thought to extend Jongman's regional study.[3] For Rome, the picture will be more complex. This study commences with an overview of timber and fuel in the Roman economy, briefly examining alternative fuels to wood. The use of charcoal fuel, (as opposed to raw wood fuel), is presented as a major issue in assessing forest consumption for fuel. Following this introduction, a model for a city's fuel supply developed on Pompeian data is reviewed as a basis for considering Rome's requirements.

2 Raw Wood, Charcoal, and Non-Wood Fuels in the Roman Economy

Studies of the ancient economy have typically looked at tradable commodities, and their movements, or proxies for consumption of these (urbanization, population growth). The (unavoidable) difficulty with such studies is that they focus on historical evidence and/or the archaeological evidence we

ble than the periods either side, facilitating greater stability and especially, agricultural expansion in what might otherwise be considered marginal areas (Büntgen et al. (2011); McCormick et al. (2012)).

2 Veal (2012b) provides an overview, the detailed study will be presented in Veal (forthcoming).

3 Jongman (1988). Jongman's (2007b) qualifying comments on his early work will also be useful, together with new Campanian studies.

have in abundance (e.g. buildings, ceramics, coins, and shipwrecks). Organic remains are yet to be fully included in economic studies, and fuel has therefore rarely been mentioned. Andrew Wilson draws attention to the importance of fuel, and speculates about the probable extent of 'deforestation' in the Roman period, but there is no substantial evidence for wholesale deforestation (i.e. in the pollen record), until the Mediaeval period, except in isolated cases.[4] He points to more recently considered evidence of olive pits as fuel. 'Alternative' fuels (to wood) are important in low wooded areas, and olive pits may be used seasonally everywhere (even in wooded regions). Fuel is gaining some interest in Roman economics, but is yet to be properly investigated as an economic good. This state of affairs has arisen because the major archaeological evidence, i.e. charred wood remains, has not been, and still is not, routinely collected and analyzed in many classical sites. Moreover, when charcoal has seen the light of a laboratory, charcoal specialists have not easily couched their results in economic terms.

Fuel, like water, food, and shelter, is an essential good. Elsewhere, I have argued that fuel in the ancient economy may have constituted perhaps as much as 20% of the Roman GDP.[5] Ancient studies of wood use have tended to focus on timber[6] since discussions of large timbers for important public buildings dominate the historical sources. However, the amount of forest consumed for fuel must have been considerable in the ancient world if we consider modern developing world analogues. In modern Africa, over 90% of harvested wood is used for fuel, while 10% is used for timber and other purposes.[7] Timber and fuel supplies both compete with, and complement each other, depending on forest management strategy. Wood grown for timber will usually need to be long and straight and consist of mature trees. Some fuel may be obtained from limb and crown offcuts after timber extraction. Fuel may also arise from fuel-

4 For example: in marginal areas (parts of north Africa), or ecologically sensitive ones (islands). See Harris (2013) for a nuanced discussion.

5 Veal (2013, 39–40). I argue for this range based on modern increasing efficiency of (fossil) fuel use as a pattern from which we may (very broadly) infer the importance of ancient fuel. This does not suggest that the scale of the ancient GDP as calculated from grain equivalences is wrong, merely that the figure for fuel is in there somewhere, and not yet quantified nor qualified.

6 Meiggs (1982) analyses evidence on timber from the ancient sources (and archaeological data) to the publication date. Charcoal analysis was a very young discipline at that time. Other more recent wood studies exist, but for Rome, the most relevant is Diosono (2008a).

7 Food and Agriculture Organization (2011). Wood for construction in any modern developing society has rarely been much greater than 20%.

specific forests grown in a sustainable pattern where 'coppice' is repeatedly harvested on a decadal (or so) cycle.[8] A range of forest management strategies from clear felling to intense coppice management exist now, and likely existed in antiquity. Given the importance of fuel over timber in forest economics, in this chapter I shall focus on this, in particular raw wood fuel, and charcoal fuel, but before examining these topics in more detail, alternative fuels shall be briefly examined.

Coal, tars, and other fossil fuels were occasionally used in Roman times where they appeared at the surface but they were not always well understood.[9] In wood deficient areas, (those of thin soils or poor rainfall, or both), and sometimes even in areas where wood was plentiful, alternatives to wood were (and are) important on a seasonal basis. Commonly, agricultural wastes such as animal dung, grape pressings, chaff and other threshing wastes, nutshells, peat and even human waste, animal bones and seaweed were used.[10] Probably the most significant of these is olive lees (or pomace). Pomace is the skin, pulp, and olive pits left over from the pressing of olive oil. It has recently been suggested on the basis of botanical remains that olive pits were used as fuel in some of Pompeii's bakeries, in Insula VI.1, and in the Herculaneum sewer.[11] Further evidence is found outside the Villa Pisanella, a *villa rustica* in Campania, where a large pile of raw pomace lay apparently draining and drying.[12] The bakery and sewer finds in Pompeii and Herculaneum have led to further speculation about the Vesuvian eruption date (October/November, instead of August, if the olive harvest was in), and a level of general excitement among classical archaeologists however, pre-historians have been familiar with pomace as a fuel for some time.[13] Its calorific potential is some 30 % higher than that of 'good' wood (i.e. decid-

8 On coppice: a number of harvesting strategies may result in the archaeological signature of so-called small or round wood, cf. Grove and Rackham (2001, 48). On ancient coppice cycles: chestnut 5–7 years, and oak 7–10 years: Columella *De Re Rustica* 4.33.1, Pliny *NH* 17.147. Charcoal evidence varies on this point.

9 Humphrey et al. (1998, 41–44); Forbes (1964). Coal was exploited in Roman Britain (Smith (1997)), while the use of peat is attested in pottery production (Peña (2013b)). I thank T. Peña for pointing out the latter.

10 Numerous case studies exist. A useful overview is provided by Foxhall (1998). Almost anything organic can be used as fuel.

11 The bakeries: Coubray et al. (forthcoming); Monteix et al. (2012); Insula VI.1: Murphy et al. (2013); the Herculaneum sewer: Rowan (forthcoming).

12 De Simone (2017).

13 Olive cultivation is noted in the Neolithic, and rises significantly in the Bronze Age (Margaritis 2013).

uous hardwood at 20% moisture content),[14] so when seasonally available, it would have been desirable. Pomace will not overshadow wood as an energy source overall, (precisely because of its seasonality). However, it will be critical in wood poor areas, as will other 'non-wood' fuels.

Almost any type of wood may be used as fuel and virtually all types are found in the archaeological record. 'Preferred' woods will be (dried) hardwoods, such as oak, beech, maple, and hornbeam, when available. These provide a similar average calorific potential. Hygrophilous woods (those living close to water), such as alder, elm, and birch, for example, have a lower average calorific potential because of their higher water content. This water will need to be driven off before the remaining calories in the wood may be released for the heating purpose intended. Resinous woods, such as conifers, can sometimes be preferred (especially montane, i.e. very hard conifers), but usually are less desirable as they can produce more smoke, and tend to spit and produce uneven heat.[15] If woods with an inferior lower calorific potential are employed, then a greater quantity of the wood will be required to achieve the same temperature, all other factors being equal.[16]

Charcoal is a preferred fuel in cases where consistent temperature is required, (whether low, or high). Charcoal fuel will provide about 1.8 times the calorific potential of raw wood. It will also burn with little, or no smoke, provide an even and 'spit-free' heat, and charcoal is about one-third the weight of wood (by volume).[17] The production of charcoal is a rural trade, and it is made from a quantity of raw wood by way of 'charcoalification' of a stack (or pit), of cut wood in an oxygen-depleted atmosphere.[18] It requires a cleared 'piazza' (or pit); quantities of fuel (usually cut to measure); and access to water (to dampen down the charcoal stack when necessary, and indeed to avoid burning down the surrounding forest). Pliny and Theophrastus tell us how to make charcoal, and Cato exhorts (workers) to 'make charcoal for the master' when excess wood

14 Heat values for different fuel types: https://www.forestry.gov.uk/fr/beeh-absg5h. For olive pomace: https://sites.google.com/site/pyrhnoxylo/pyrenelaiourgeia-1/to-pyrenoxylo-san-kausimo/anglika.

15 It should be noted that conifers, due to their resinous nature tend to burn more to completion, and so even when employed as fuel, may be under-represented in the archaeological record.

16 There are limits here in that very high temperature processes (mostly metal smelting and smithing) require 'best' types of fuel.

17 Veal (2012b, 126).

18 Veal (2012b, 23–24).

is available.[19] To some extent, these texts have been taken together to assume that charcoal making is an easy and almost spontaneous task, but the opposite is true. Care and planning to cut woods (in Autumn/Winter), sort, stack, dry and char them (usually in Summer), and the high technical skill required, preclude economic quantities of charcoal being made spontaneously, although it is true that anyone can make charcoal in small quantities. Charcoal makers did of course concern themselves with other aspects of woodland management when not making charcoal. Attestations of ancient charcoal making *piazze* are rare, as the archaeological traces are scant. However, during building of the fast train between Naples and Rome, an ancient charcoal making area was discovered near Valmontone at a site called 'Colle Fico'. It was dated 4th–3rd century BC, and showed evidence for a village of charcoal makers. The dominant feature was a shallow rectangular hole (0.5 m deep), over an area 20 × 15 m (forming a large horizontal stack). A variety of charred woods were detected including: oak, hazel, minor elm, grape cuttings, and even ferns.[20] This interesting variety of woods (and sizes of woods), suggests a lack of selectivity for wood used in charcoal making in this instance, and appears perhaps to be related to the agricultural season (fruit cuttings were common). A factor in recognising archaeological evidence for charcoal making has often been the presence of uniformly cut branches and limited wood types (i.e. 'coppiced' woods). These were preferred in the Roman period, and attested in Pompeii and at Silchester (Roman Britain),[21] so the Colle Fico evidence prompts the question as to when, and why, charcoal making using standardized wood types and lengths occurred. Hypothetically, requirements in the Republican period in the countryside were not so stringent as to product quality. Then in the Imperial period, as population and technological knowhow increased, a more industrialized and standardized form of charcoal making became more prevalent. More evidence is required to support this hypothesis.

19 Method to manufacture charcoal: Theophrastus *Hist. Pl.* 5.9.2–4, Pliny *NH* 16.8.23; 'making it for the master': Cato *De Agric.* 38.4. See also Olson (1991, 412).

20 The site has been formally published (Bellini et al. (1998)) but the results are also evocatively presented in the museum at Valmontone, with a diorama of the charcoal making site, and a detailed exposition on different charcoal making methods, contact details http://www.museumgrandtour.org/it/i-musei/museo/museo-di-palazzo-doria-pamphilj/.

21 Pliny *NH: 16.23*. See also Veal (2012a, 233 FN 44; 2012b, 38–39; 2013, 51–52) and note 8 above. Modern charcoal making is usually carried out using very uniformly cut branches and limited wood types.

Observation of archaeological charcoals and examination of ethnographic evidence suggest charcoal was made using different 'recipes' depending on its intended use. Charcoal for domestic use could be made at the rate of 4–5 volumes of wood to produce 1 volume of charcoal (to produce a product that is about 65% Carbon). This process leaves in some of the organic volatiles so that later combustion is facilitated. For industrial uses such as iron smelting and smithing, a higher quality of product (perhaps 80–85% Carbon content) was required,[22] and would take a minimum of about 10–12 volumes of wood to make 1 volume of charcoal.[23] A number of important questions therefore arise: how much charcoal to raw wood was used; and, how much 'high C' content charcoal was used compared with 'low C' content? To help answer the former, we now have a new scientific test called 'reflectance' that can tell us if a fire was a charcoal fuel or raw fuel fire.[24] Ethnographic data through time and space also support the proposition that the Pareto effect holds for fuel consumption: if you live in a city, you use mostly charcoal (perhaps 80%), and only some wood, and if you live in the country, the opposite ratio occurs.[25] To answer the latter question about the 'quality' of charcoal fuel, presuming we have securely identified and dated archaeological contexts, measuring absolute Carbon content may provide some answers, but this work is in its infancy.[26]

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22 Schenkel et al. (1998, 515).

23 This is a conservative estimate, based on a Roman charcoal production and iron smelting experiment (Hutchinson (2003)). Some research suggests as much as 20 volumes of wood could be consumed, it depends on the skill of the charcoal maker.

24 Veal (2012b, 23–24). The matter is not simple, however, as many tests will need to be carried out on charcoal data collected from many well-documented archaeological sites, in order to better inform discussion. Also, a fire may be typically started using kindling, and continued using charcoal, although kindling being small, and usually pretty flammable, we might expect burning to completion to occur (with little residue to be discovered archaeologically). Mixed charcoal, wood (and even coal) fires were likely where ancient iron working was carried out, and have been found, for example, in Roman Britain (Veal 2012a).

25 The Pareto Effect is otherwise known as the 80/20 rule, and named after Vilfredo Pareto who invented it upon observing the ratio applied to many economic, financial and natural phenomena; E.g. 20% of the population owned 80% of the land. In the case of wood and charcoal: the richer city dwellers use 80% charcoal (a more expensive commodity) and 20% wood, while the poorer country-dwellers use the opposite quantities of each. See also Veal (2012b, 41–42) where specific examples for modern day developing, but wood dependent nations are discussed.

26 Measuring Carbon content is relatively easy, but its relevance to our discussion relies on the assumption that archaeological charcoal in general is pretty inert, i.e. we assume the

3 Domestic and Industrial Fuel Types

The implications for the fuel supply to Rome are obvious. Charcoal fuel would have been safer and more desirable as a fuel, probably both domestically and industrially, and it would have been cheaper to transport over any extended distance. The limited dimensions of portable cooking hearths and the closed nature of heating braziers from Pompeii suggest charcoal as the most probable fuel (over wood). The historical sources explicitly state *carbone* is the fuel of choice in braziers.[27] Charcoal fuel of high quality was required for iron smelting and smithing, and preferentially used in some kitchen recipes.[28]

Scientific tests on archaeological charcoal remains will assist us to discover whether charcoal or raw wood has been used, but the matter may be also be considered from the point of view of technology employed, and fire characteristics. Most processes requiring temperatures below about 800–900 °C (much ceramic production, and firing the baths, for example) do not require charcoal, and high temperature processes (above 1100–1200°C), i.e. iron smelting and some smithing, definitely do.[29] We cannot presume charcoal is not used in lower temperature processes, but common sense says it was less likely, (being wasteful), and charcoal assemblages examined (e.g. from ceramic making sites) appear to confirm the use of wood (when available). We are not sure at this stage about processes between these temperatures but kiln technology advances go hand in hand with higher production temperatures. A further consideration is the type of fire required. Slow and steady fires, whether low temperature (e.g. for delicate recipes), or high temperature (for iron smelting), are best served by charcoal fuel. Technologies requiring sudden temperature rises and declines, can often best be served by raw wood, and even, supposedly 'inferior' fuels. Straw, for example, burns quickly but is useful to 'flame up' a dying fire, or help start one. Conifers are also useful in this way.

C-content won't have altered over time, due to taphonomic, i.e. (post-depositional) effects. Experimentation is just getting underway in this area.

27 Veal (2012b, 126).

28 Apicius' recipes and complementary pottery studies suggest both wood and charcoal fuel were used in Roman kitchens (Apicius (2006), analyzed in Veal (2013, 55)).

29 Sim (1998).

4 The Pompeian Fuel Supply, 3rd Century BC to AD 79

The fuel supply to Pompeii over c. 400 years has been considered elsewhere in detail.[30] Here, I shall use the same approach and particularly the quantitative model developed, in order to estimate Rome's fuel supply. In Pompeii, examination of c. 4,000 charcoal fragments excavated by four excavation teams in four sites, representing differing socio-economic groups, and possibly up to 11 different owners (at the AD 79 level) was undertaken. The fuel economy of ancient Pompeii was found to consist mainly of beech (75–50% decreasing over time from the 3rd century BC to the 1st century AD);[31] a group of secondary woods: oaks, maples, hornbeams (which increase to replace beech); fruit and nut cuttings (present in the 1st century BC, and increasing dramatically in the 1st century AD); and a few other incidentally included wood types. Since beech in ancient central Italy (in the presumed climate)[32] prefers altitudes above at least 600 m,[33] and photosynthesis is actually optimized in the range 1200–1500 m,[34] a substantial fuel economy, providing wood and charcoal from uplands to lowlands, is inferred. Its precise nature may have taken many forms: pure market supply, vertical integration (mountain to individual villa supply), and variations in between, either monetized, barter, or patronage based. The rise in the number of fruit and nut cuttings points to both the Roman habit of bringing exotics back to Italy, as well as the probable increase of these tree types in the city and the *ager Pompeianus* after the Roman political takeover.[35] These exotics reflected greater expression of *otium*, enhancing diet and lifestyle in general, and possibly were exported further afield than Campania.

The Pompeii/Campania model addresses quantitatively a limited range of probable population sizes and possible fuel consumption levels in the coastal

30 Veal (2012b). A copy of the model and a brief discussion of its variables, and limitations are also available at http://www.robynveal.com/a-quantitative-model-for-the-ancient-fuel-supply-to-pompeii-ad-79.html.

31 Veal (2012b), beech's dominance continues to be attested by new data under examination in Pompeii by the author (the via Consolare Project), and at the House of Amarantus (Challinor, pers comm.), as well as in different locations in northern Campania.

32 See Note 1. The importance of micro-climate in regional and sub-regional areas cannot be measured by such broad studies, however, for Pompeii a climate roughly similar to that of today is assumed.

33 Pignatti (2003, 110).

34 Pignatti (1997, 487–490).

35 I thank W. Jongman for expressly pointing out this interpretation.

city. Results are specifically interpreted in light of the area of southern Campania, which is presumably the primary fuel source (being the nearest). A revision of the holistic model(s) of the entire agricultural economy of Campania (and fuel's place in it) is underway. This revision will include where, for example, major industries may have been located, these being large fuel consumers. We know bread baking was a city activity, and some iron smithing, but the number of industrial installations in Pompeii is insufficient to serve the city's needs. Pottery and tile making is also only partly understood, with few kilns known in or near Pompeii but this lack of manufacturing evidence does not tally with the large number of Pompeii signed amphorae found in the wider Mediterranean. Pompeii also competed for its resources with its nearest neighbours in central and southern Campania, Nola and Nuceria. The situation for northern Campania needs separate consideration and integration.

For Pompeii, the range of volumes of fuel and the inferred possible forest areas, together with the ecological constraints of the major wood type, beech, suggest the quantity of beech consumed could not have been provided locally on Mt Vesuvius, nor even intra-regionally. Supply from outside the immediately accessible Campanian Apennines, into the heartland of Samnium, and/or from more southerly latitudes is therefore inferred for Pompeii and Campania generally. Thus, reflected in the fuel supply of one small to medium-sized port city, we see indications of complex intra-regional organization for fuel, as well as potentially, extra-regional supply, supporting the view of a linked and sophisticated Roman economy in this regard.

5 Applying Pompeii's Model to the Fuel Supply of Imperial Rome: 2nd Century AD

A few words of caution are required at this point. The model as currently developed for Pompeii is fairly basic, and in its application to the city of Rome, the obvious differences in city size and the sheer uniqueness of Rome cannot be overstated. Rome was a magnet that drew supplies in, both regionally and extra-regionally. There were significant cities in Lazio that competed with Rome for natural resources, and fuel would have been one of the key commodities in this respect. For Rome we may consider a range of population levels and can presume that fuel uses will be similar to those of Pompeii, if on a different scale, with large-scale industrial activities located outside the city centre for the most part. We also have some useful information on the wood supply market, and the obvious key transport mode, the Tiber. Ultimately fitting fuel into the agricultural economy of Rome and Lazio will be possible but com-

plex.[36] For the present discussion, I examine 'order of magnitude' quantitative results, preliminary charcoal results (which serve to assess ecology, and therefore possible supply areas), and consider further steps that will be required to fully model Rome's fuel supply through time.

The quantitative model from Pompeii may be adjusted for relevant variables relating to Rome at its highest population level. The model employs a strategy of multiplying the population (a range is considered)[37] by its expected fuel consumption (per capita, per year, again a range is considered), and moderating this by considerations of the possible proportions of raw wood to charcoal fuel. No allowance is yet made for the use of differing qualities of charcoal fuel.

The basic calculation to estimate the forest area required to support the fuel supply is:

> POPULATION (a range of possible figures) x FUEL CONSUMPTION / FOREST PRODUCTIVITY
>
> Where
>
> FUEL CONSUMPTION = (% RAW WOOD + % CHARCOAL)
>
> and
>
> CHARCOAL = RAW WOOD x (EFFICIENCY FACTOR from 4–7):
> (making a total of Raw Wood required for Charcoal production)

If we select a couple of different scenarios, we may start to compare forest required, with the available land in Lazio. Firstly, two extremes of population and the ratio of charcoal to wood consumption are considered for differing forest productivities.

1. Low population (600,000), low total fuel, and low charcoal consumption (1.0 tonnes/capita/year and 20% charcoal, 80% wood), with charcoal made at a ratio of 7:1, and low (2 tonnes/hectare) and medium forest productivities (4 tonnes/hectare). These consumption variables require

36 This work will stand on the shoulders of many past and present researchers, too numerous to mention, but especially, those studying demography, the topography of Rome, the Ports, the Tiber Valley; and excavations generally in Lazio.

37 It is not the intention to review the Rome demography debate. Values considered are: 600,000, 800,000 and 1,000,000.

forest areas of 0.66 million or 0.33 million hectares, (i.e. 6,600 or 3,300 km^2), respectively.

2. High population (1,000,000), high fuel and high charcoal consumption (2 tonnes/capita/year and 80% charcoal), with charcoal made at a ratio of 7:1, and low (2 tonnes/hectare) and medium (4 tonnes/hectare) forest productivities. This combination of variables requires forest areas of 5.8 or 2.9 million hectares, (58,000 or 29,000 km^2), respectively.

Therefore, a low of 330,000 hectares or a high of nearly 6 million hectares would be required, if we consider these two extremes. This is a wide range, and the low value is less likely, since Rome's technological sophistication in industrial production of foods and commodities suggest a high probable use of fuel, and not only raw wood fuel. Fuel consumption had to have consisted of a substantial amount of charcoal in the city. We shall move to a middle count for population of 800,000, and argue for a high level of total fuel (2 tonnes/capita/year) and high (80%) charcoal consumption levels, based on Rome's high technological advancement, and the large volumes of wood needed as fuel for the baths. In this case, a forest area of 2.3 million hectares/annum might be a reasonable 'middle' result, assuming efficient forest management of 4 tonnes/hectare. All of these calculations have adopted a 7:1 charcoal fuel production ratio (wood volume to produce charcoal). This is a mid point between the '4 or 5 to 1' ratio for domestic charcoal, and the '10–12 to 1' industrial ratio. We have no information at the moment on the ratio of domestic to industrial charcoal. Modern Lazio's area is 17,236 km^2 (i.e. 1.7 million hectares). We can see that results suggest the lowest count (which presumes a low use of charcoal, and low population), is about one-fifth the area of modern day Lazio, and the mid count is 30% greater in area than modern day Lazio (and the high count is over three times Lazio's area). By implication Rome is impinging significantly on the wood supplies of other regions, if the mid and high counts are more credible.

6 Broad Evidence for a Wetter Climate on the Tyrrhenian Coast

Charcoal remains from five central Rome sites have been analysed, in addition to those from five extra-urban / rural sites,[38] and several of the sites exhibit

38 Sites under study, and their respective directors include: (under) Santa Maria Antiqua (H. Hurst, Cambridge), (under) Palazzo Valentini (P. Baldassari, Provincia di Roma), (under) Piazza Navona, the Palatine (C. Pannella, La Sapienza), Vigna Barberini (M. Dewailly,

more timber than fuel.[39] Overall wood types present a picture of mostly mesophyllic (i.e. temperate) woods, suggesting supply areas had a milder and wetter climate than the presumed macchia/evergreen composition typically called 'Mediterranean' and considered to be the dominant forest type, especially in coastal Italy. Alpine fir is used extensively in building, and there are also quantities of deciduous oaks, elm, beech, and hornbeam, (possibly fuel, or timber), and smaller elements of fruit and nut woods (plum group and hazel). This phenomenon is also observed in the Pompeii data where very few true thermophyllic (heat tolerant), or even colonizer types are present in the fuel. Colonizer types indicate an environment under pressure. It should be recalled that the data end at AD 79 in Pompeii, while in Lazio the dataset yet to be fully reported commences as early as the 7th century BC (Gabii), and extends to the 18th century AD (Villamagna). Late Roman data from Campania[40] provide a view of very localized consumption of fuel in two *villae rusticae*, and suggest a significant increase in chestnut used as timber in this period, whilst also supporting a view of a wetter, milder climate than we might have supposed. At present it is not possible to provenance charcoal,[41] but these data, taken together and compared to the most recently collected pollen and macrobotanical data from the ports of Rome, Naples, and Pisa,[42] appear to provide strong evidence for a more humid climate, one which may have more easily facilitated rapid domestication of exotic foods arriving into the area from the East.[43] Further this 'wetter

and F. Villedieu, Ecole Française, Rome), Sant'Omobono (N. Terrenato, Michigan). Regional sites: Gabii (N. Terrenato, Michigan), Castelporziano (A. Claridge, Royal Holloway), Portus (S. Keay, Southampton), Villamagna (E. Fentress), Ostia Antica (OSMAP Project, L.M. White). I thank the excavation directors for their interest and the chance to examine their charcoal. These datasets vary greatly in spatial and temporal coverage, and preliminary reports have been completed for each. Full publication is imminent only for Villamagna (Veal in press), while manuscripts are in final stages of preparation for Santa Maria Antiqua, Portus (monograph chapter), and Gabii, areas A and B (digital publication). Full details will be provided on my website in time, www.robynveal.com.

39 I shall report on timbers from Roman buildings in a future study. Species observable are often different to those used for fuel (demonstrating separate harvesting strategies for the most part). It is usually, but not always, possible to differentiate charcoal remains originating from building timber, from those originating from fuel.

40 Vairo et al. (2015). Studies on Campanian woods have increased recently (Moser et al. (2013); Allevato et al. (2012); Coubray (2009 and 2012)).

41 Strontium isotopic provenancing of charcoal has been reported by E. Asouti (pers. comm) in modern day Turkey, the results are yet to be published.

42 Sadori et al. (2015).

43 In particular, various types of *Prunus*, especially, *P. persica* (peach).

than expected' climate supports the developing proposition that grapevines were probably dominant (over olives), and that stone fruits of all sorts were also very significant on the Tyrrhenian coast and further inland.[44] Kron's proposition for a more productive agricultural economy is also supported, at least in Lazio and Campania.[45]

7 Towards an Integrated Model over Time

Fuel consumption will rise with cooler climate, increasing population and urbanization, increasing incidence of cremation, and greater intensity of industrial production, and especially, technological advancement. Fuel consumption will decrease with temperature rise, population decline, inhumation, and loss/reduction of industrial activity. Investigating these patterns in detail is a future challenge. Elsewhere in this volume T. Peña proposes a model for trade activities based on distance from the main market. The model proposed here for the agricultural products of wood, and wood charcoal, is not in direct contradiction to his proposal, but it focuses more on ecological principles, as well as practical and socio-economic ones. It does contradict von Thünen's model[46] which places the wood supply for a city in close proximity. Von Thünen's model probably does apply to small towns where land availability is high enough to locate both agriculture and forests nearby.

If wood consumption is in the order of magnitude proposed here, and the varieties of woods consumed consist of mixed deciduous types that grow well on the Apennine mid-slopes, but also could grow in the plain and even in the city, where did the fuel supply for Rome come from? Some fuel may have been collected from *horti, palaestrae*, and other public areas in- or close to the city. Clearly however, the great volume of wood required for a large city had to come from large forested areas, i.e. those climes on the mountains not so suitable

44 On the intensity of viticulture in Campania: De Simone (2017); for Lazio, see Marzano (2013a); De Sena (2005); Veal (2017).

45 Kron (2012).

46 Von Thünen's famous 'Isolated State' (1826) was an early model for predicting land use. A useful English translation is available (von Thünen (1966)). Subsequently criticized for not sufficiently addressing, e.g. differential transportation modes, variations in topography, soil fertility, and price/demand issues, it still is repeated and quoted, particularly in relation to ancient cities (see also De Haas (this volume)). Wood fuel is placed in 'ring 2' in a design which circularly arranges goods' origins for supply to the city center. This locates fuel just outside the perishable dairy and market gardening goods of 'ring 1.'

for arable or other purposes, or perhaps used for dual purposes (e.g. oaks and pigs, deer hunting in beech forests).

8 Price and Transport

Some considerations of price may be useful, not only of fuel, but also of costs of transport. Jongman[47] states that "provision of some economic wants lies outside economics when the means of supply is unlimited." To some extent, in earlier periods, this must have been true of raw wood fuel, especially if *ager publicus* was accessible for wood gathering. Wood may have been an almost free good, except of course, that wood cutting, delimbing and even transporting, take time, and time can equal money if other income earning possibilities are available. If we agree that over-supply of labour in Roman agriculture existed,[48] then the activity is adding income using 'free' inputs. The access to 'free wood' will have declined with the transformation of *ager publicus* into *ager privatus*.

Could large-scale fuel provision have occurred from *ager publicus* at any time?[49] The documentary sources provide little evidence on this matter. Diosono[50] has argued that wood fuel was part of the *annona*, and while many references to provision of wood for public purposes may be found in the ancient sources (especially for the baths), specific attestations suggesting free provision of wood for the poor are lacking. Rather, wood fuel often formed part of taxation, especially in the provinces. We have very little information on the price of wood and fuel except for Diocletian's Edict. From these data a transport cost/benefit analysis for alternative transport modes (sea, river, road) has been completed for Pompeii.[51] This showed that costs of transport are a significant factor in the fuel supply, and that river or sea transport provide better options at the distances inferred for supplying Pompeii's fuel. Road transport could only be economically viable at short distances (up to about 10 km). Of course, using the Edict is problematic for many reasons, but it does provide a base from which to view the differing relative costs of raw wood, kindling

47 Jongman (1988, 42–43).

48 See for example Erdkamp (1999).

49 A more detailed consideration of this phenomenon is required than can be offered here, and indeed the effects of the rise of Catonic estates may have been significant. *Ager publicus* still exists in modern rural Italy in many remote areas. Access is carefully controlled.

50 Diosono (2008b, 84).

51 Veal (forthcoming).

and transport costs, without placing too much emphasis on the absolute prices. Unfortunately charcoal is not priced as a sole commodity, although its costs of transport are specifically provided.

To carry out this evaluation for Rome, we will need far more precise data on the types and relative proportions of woods consumed in order to evaluate their potential supply areas. We can say with certainty that transport is a key issue for fuel. Wood is three times the weight by volume of charcoal and depending on the distance and the mode of transport, will only be economic as a fuel if produced reasonably close to the city.[52] If fuel has to be supplied from a great distance, because of the exigencies of cultivation of *pastio villatica* crops close to Rome, then charcoal will be cheaper to provide, due to its weight advantage. There are few direct indications in the Roman literature for fuel transport[53] although we may speculate that the *portus inter lignarios* built on the Tiber below the Aventine c. 192 BC, (presumed by Meiggs and others to facilitate the receipt of timber), may have also received fuel.[54]

Transport up, or down the Tiber will have been highly probable, with fuel originating from the far reaches of modern day Umbria, the Latial Apennines (as for timber), and potentially from the coastal areas of Tyrrhenian Italy. Cabotage ships may have brought fuel in, and transported goods out of Rome to other regions of the peninsula. No firm conclusions can be made about the possibility of large-scale trans-Mediterranean trade. Even in the highest period of consumption, Italy's wood carrying capacity was much greater than the population's requirements, as Grove and Rackham suggest.[55] Charcoal in the (marine) archaeological record is also very difficult to assess. If charcoal had been transported by sea on a regular basis, (either as primary cargo, or incidentally, along with other commodities), then charcoal fuel (in a wreck) is unlikely to be preserved. Once soaked, it collapses and fragments to very small material that would be lost in the surrounding sand quite quickly, and so the underestimation of charcoal fuel sea transport is highly probable.

52 This calculation requires us to know the price differential between raw wood and charcoal fuel; for Pompeii an estimate of 5 times was made.

53 Although in the Piazzale delle Corporazioni di Ostia, a mosaic depicting some *navicularii lignarii* may be found (*CIL* XIV, 278), which is dated to the 2nd century AD (Meiggs (1980)).

54 Meiggs (1982, 246).

55 Grove and Rackham (2001, 174). The one ancient source recording trans-Mediterranean wood transfer is Late Roman. Wilson (2012) infers that this single source suggests trans-Mediterranean fuel trade may have been common, but one anecdote does not equal a market, and it was more likely of a tributary nature.

Most of this discussion relies on market forces (as we understand them) steering the economy, but of course it is possible other factors such as tradition, patronage, religious behaviors (demand for, or avoidance of, specific woods) influenced fuel supply mechanisms. The evidence presently available suggests specific selection of high calorific fuels for consumption in cities, probable conversion of a large amount of wood into charcoal, and more prosaic use in *villae rusticae* (as we may expect). Interestingly, some less suitable fuels, (i.e. those which smoke a lot, such as fig), appear to have been avoided. Woods associated with private ritual sometimes appear to have a very different profile (and were selected for fragrance, or association with the fruits and nuts sacrificed, as has been found in the House of the Vestals).[56] The volumes concerned are probably not significant, compared to general supply. One area that may be difficult to investigate will be the possible vertical (i.e. self) supply by the wealthiest elite who may potentially have operated completely outside any market supply basis, although ecological constraints will still factor strongly in any considerations. Even if the elite established private vertically integrated fuel networks they will have accessed similar wood growing areas as those used for commercial supply.

9 Conclusions

This analysis has attempted to present the importance of the agricultural commodity of fuel. It has considered raw wood fuel, and the more important commodity of charcoal fuel. It has very broadly suggested the quantitative parameters for fuel consumption in Imperial Rome at its height, and briefly attempted to nuance this with considerations about the differing fuel types that might have been employed for different purposes, based on comparative data from Pompeii. Charcoal remains have so far only been rarely collected during excavations in Rome (although practice is now changing). Much of the examined material provides a view of the timber supply, which shall be reported shortly. This chapter is in part a call for more excavators to collect charcoal.[57] Scientific tests that are currently being carried out on the excavated Pompeian charcoals may allow further nuancing of the quantitative model proposed. Both in Campania, and Lazio, we see a picture of a highly organized fuel supply, but

56 Veal (forthcoming).

57 My website www.robynveal.com and Academia.edu pages provide more information. For field collection: http://www.robynveal.com/field-collection.html.

it is important to remember that these regions are very particularly large consumers, in comparison to other less populated and more distant places. The provinces are yet to be considered.[58] Von Thünen's model places wood in close proximity to a city. Clearly this is not so for Rome, and not even so for Pompeii. Lazio and Campania were highly fertile, and densely populated and farmed, with supply systems weighted to high value *pastio villatica*, and other perishable goods, close to their major cities. They provide a view of agricultural systems probably well organized, with every available corner of agricultural land put to use, and suggest that wood may not have been economically farmed in the plain or the fertile mountain lowlands, but instead relegated for the most part to the mid and upper slopes of the adjacent Apennines and further afield. In Campania, the most commonly observed fuel in Pompeii, beech, has an ecological comparative advantage for growth in the high Apennines. Few other natural resources can grow at this altitude (alpine fir is the exception). Wood fuel production requires large areas of land, and it is essential to consider the general competition for that land from the production of other (possibly higher value) agricultural products. For rural communities within striking distance of large cities the size of the fuel supply must have meant the opportunity for farmers to produce fuel for the city market to some extent. For a city the size of Rome, we may speculate that charcoal production on an industrial scale occurred in the Apennines and perhaps elsewhere in other regions' agricultural communities.

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58 Roman *Londinium* is under study as a contrast.

tute for Archaeological Research, University of Cambridge. To the directors and excavators of the many teams from whom I have been able to obtain, and identify charcoal, I express my deepest gratitude of all.

CHAPTER 16

Where Were the Coins We Find Actually Used?

Michael Crawford

1 Introduction

The invitation to contribute to this volume, for which I should like to thank the editors, is evidently an invitation to revisit what I argued in 1970, in the context of a general discussion of money and coinage in the Roman world, not now repeated here, namely that the actual use of coinage, during the last two centuries BC and the first two centuries AD, was essentially an urban phenomenon.[1] In nuancing and, I hope, strengthening that argument, I now give much more emphasis to the methodological problem of assessing the velocity of circulation of coin in the Roman world, given the failure of much recent discussion to see its importance. Thus D.B. Hollander discusses only the presence of coin, not the velocity of its circulation.[2]

Given the theme of this volume, I concentrate on Italy, excluding both Egypt and the military world of the frontiers, though it is perhaps worth observing that, in relation to the Appianus estate in Egypt, the late Jean Bingen and Dominic Rathbone seem to me to be talking at cross purposes:[3] no-one has ever doubted that money was there systematically used as a measure of value, and the estate was in that narrow sense monetized; but I see no incompatibility between this and wine being the main 'currency'. Even on Rathbone's view, two-thirds of all transactions were probably credit transactions. What seems to me important is Rathbone's demonstration that wages and prices on the estate were sensitive to the market in general. But in any case, the relevance of a large, complex, centrally-administered estate to rural sites in Italy is likely to be limited.

I also leave aside the late Empire: as is well known, late Roman sites tend to be littered with small bronze coins, but this may be partly a consequence

1 Crawford (1970), revised as chapter 5 in *La moneta in Grecia e a Roma* (1986, 103–129). I should like to thank, without implicating, Fergus Millar, the audience when the paper was given in Rome, and the editors, for their comments.

2 Hollander (2007, 122–135).

3 Rathbone (1991, 318–330; with 112–113, 162–164, 178–179, 266, 300–301, 372; and 70–71 for the independent administrators).

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of their small size, which made them vulnerable to falling through holes in pockets or purses, as Ann Johnston once remarked to me, and which tended, along with their colour, to make them indistinguishable from the mud into which they fell; and the pattern of late Roman circulation, after the chasm of the 3rd century AD, a pattern to which I plan to return in the Introduction to the forthcoming edition of the Edict on Maximum Prices of Diocletian, is so different from that of the early Empire as to make separate discussion essential.

The present problem is a very simple one: no-one doubts that the surplus produce of the countryside was in large measure sold; but how far was the resulting cash *used* there? Or, to put it differently, how does one relate the archaeological evidence for coins, inconveniently unlabelled with the status of their owner, and the textual evidence for coinage and money, heavily biassed towards the elite? We shall see later that coinage sometimes circulated in central places that one would perhaps hesitate to describe as towns, that may also have been places of craft activity; and no-one would wish to deny that there were periodic fairs and markets in the countryside. It is thus an essential part of my argument that, as far as we can tell, the velocity of circulation on sites that are really rural, isolated farms and hamlets, is very firmly not that of central places.

So when J.-P. Bost suggested that in Iberia coin circulation in the countryside was basically similar to that in the towns, just less intensive and less well-supplied, the suggestion does not get us very far.[4]

2 The Archaeological Data

The archaeological side of the problem is easily formulated. If one finds, e.g. at Pompeii what is pretty clearly a fast-food outlet, with a pile of coins of various denominations under the counter, few will dispute the inference that the coins were used in the context of the outlet in question. I should here like to draw attention to an important book that marks a real advance, namely the recent monograph by Richard Hobbs, which for the first time publishes the coins from an entire context at Pompeii that is earlier than AD 79. He shows that it is a context that is earlier than the Social War, in which the lack of main-stream small change was compensated for by the use, sometimes overwhelming, of imitative issues of Massalia and Ebusus; and that although large-scale halving

4 Bost (1980).

of asses took place, first in the 20s BC and then in the 30s AD, as argued by T.V. Buttrey, it also occurred in the early to mid-1st century BC, presumably to create small change.[5] The book thus adds very substantial depth to our picture of a society whose economy depended heavily on the use of coinage.

As far as I know, however, there is no excavated rural context, in Italy or elsewhere, that actually suggests that the coins found there were also used there. A recent find from Switzerland indeed very strongly suggests the opposite: it is from what is described as a *villa rustica* and consists of 45 HS of Severus Alexander, found inside a silver cup, itself inside a bronze bowl.[6] A similar find of the Republican period comes from Castellone a Volturno, now part of a small, remote village and in no period to be described as urban:[7] 156 denarii, along with 2 gold ear-rings and a silver cup inscribed Q. ACLI, with early *a* and hooked *l*, all inside a bronze vase.[8] We are dealing not just with hoards, but with hoards that seem to have been rather carefully immobilized.

The slipperiness of our archaeological evidence emerges well from the meticulous excavation at Monte Irsi by Alastair Small: Site B is an outbuilding occupied between 150 and 100 BC, from which comes a tiny amount of bronze coin of the 3rd and perhaps the early 2nd century BC; Site A was occupied c. 100 BC and again in the Augustan period, and has also a tiny amount of bronze coin of the same periods as at Site B, a small amount of Augustan bronze, but mostly 1st century BC denarii, a period when the site was unoccupied;[9] they are perhaps part of fill from somewhere else or a dispersed hoard. In neither case, of course, would it be possible to tell when the coins were lost.

At Pievina, not very far north of Rome, the coins of the 2nd and 3rd centuries AD appear in 'late antique' contexts, apparently 5th-century AD, in Structure D, probably re-deposited, since there are no other traces of 2nd- or 3rd century AD occupation; and an as of Tiberius in a post-5th-century AD phase of Structure D.[10]

Similarly at Umbrian Scoppieto, there is a very substantial dislocation between the dates of the coins found and of the levels in which they were found.[11] It is also Scoppieto that provides what must be the ultimate case of

5 Buttrey (1972); Hobbs (2013, 5–17 for use of coinage at Pompeii and 91–92 on imitations).

6 Ackerman et al. (2004, 38).

7 Suppressed as a Comune and now forming, with Pizzone, Castel San Vincenzo.

8 *Documenti inediti* (1879, 24–25).

9 Small (1977, 210–216, 96).

10 Ghisleni et al. (2011, 107–112).

11 Bergamini (2011, 22–62, with the Table on pp. 37–40). A large proportion of the coins found came from top-soil and many of the levels are only very imprecisely dated; but 34 of the

coinage of the long distant past appearing on a rural site, a 5th-century BC litra of Messana, that had pretty certainly never circulated there, used along with a 3rd/2nd century BC bronze of Tyndaris to decorate ceramic plaques.[12]

If one turns to remote Bruttium, the evidence seems to show coinage remaining in circulation for centuries, Greek coins of the 4th and 3rd centuries BC in 2nd to 1st-century BC levels at Oppido Mamertina, 3rd century BC coins of the Brettii still in circulation in the 1st century BC.[13]

3 The Literary Sources

The most systematic attempt, I think, to use the literary evidence relating to a part of the Roman world is Fergus Millar's article on the Golden Ass,[14] based on the *Metamorphoses* of Apuleius and set in Greece, not Italy, to which I come just below, which argued, in the résumé of Christopher Howgego, that 'even on country properties purchases and wages are in cash';[15] it is a claim that has again recently been cited with unalloyed enthusiasm by D.B. Hollander and Elio Lo Cascio.[16]

Unfortunately, however, if one looks at the entire pattern of economic transactions in the novel, they do not quite prove exactly what Fergus Millar concluded. As far as the end of Book IV, all the action takes place in a city, whether Hypata (Apuleius I, 24; *Onos* 2), Larissa or Plataea, as does the auction of livestock at VIII, 21–25, where *Onos* 35 allows us to identify the city as Beroea. The first transaction involves the purchase of produce from the countryside; but it is in a city that it is sold. Similarly, at IX, 32, a gardener sells his produce in a

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coins from III.2, IV.1, and IV.2 are much earlier than the levels in which they were found, only 7 are broadly contemporary.

12 Bergamini (2013, 257–264): the plaques were found in the fill of a dis-used Augustus to Trajan building, and may be late Republican or early Imperial. The head of Hermes and the star may not derive from coin types.

13 Visonà and Frey-Kupper (1998); the evidence from Satricum is too small-scale to help: Gnade (2007, 86–90).

14 Millar (1981).

15 Howgego (1992). I am puzzled by the *desinvoltura* with which there is proposed on p. 19 a monetary system where the lowest priced commodity and the lowest normally available denomination were the same: it is rather hard now in the UK to find much priced below a pound, but its hundredth is in regular circulation. Howgego also engages in an over-hasty reading of Rathbone (1991).

16 Hollander (2006); Lo Cascio (2008, 169–170); de Ligt (1990 and 1991) was more cautious, but still did not address the question of velocity of circulation.

town. At IX, 10, the worker for a wage and the sale of a dolium are unlocated. In the story of the bribe of a lover to the slave of the husband of the object of his attentions at IX, 18, the husband is a decurion, the bribe in gold, and the context clearly urban. And at the very end of the work, at X, 9 and 15, the two sales, one for gold, occur in an urban context. Similarly, at the end of the *Onos*, the ass is sold in a populous village (41–42), re-sold in another village, that has a large mill and a bakery, to a market-gardener who uses the ass to take produce to sell in the city (43), and finally sold to someone from Thessalonica (48). To set against all this, there is just the sale of a load of wood to a farmer (31).

Robberies in the countryside at Apuleius VII, 8, are of gold coins, suggesting precisely the immobilization of money apparent from the Swiss and Italian finds just mentioned.[17] Once we look at transactions in the countryside, the use of money is intermittent: at VII, 15–18, peasants bring their grain to be ground, and pay for it, and also buy barley (but see *Onos* 28, where the ass is hired out to grind barley in an un-named village, with payment being made in kind); at VIII, 19, some fugitive slaves make an unsuccessful attempt to buy cheese from a goatherd; and the Syrian priests receive some bronze and some silver from their adherents, but above all wine, milk, cheese, coarse flour, fine flour (VIII, 28; *Onos* 37).

A puzzle remains over the economic role of a *castellum*: at IX. 10, an ass is auctioned in a village within the ruins of a city, but its destination is a *castellum*; and at IX, 31, an ass is auctioned in a *castellum*.

There is one further point that can be made: Millar did not justify his belief that Apuleius could be taken almost as documentary evidence; but one particular detail encourages that belief, namely when the narrator of Apuleius, of Roman origin, is amazed to discover that in a Greek community the local magistrates controlled the price of fish (I, 24–25): it is precisely a detail added by Apuleius to the story in the *Onos*.[18]

Turning to Italy and to a text that has so far not been exploited, the *Moretum*, attributed in the manuscript tradition to Vergil, but probably Julio-Claudian in date, tells the same kind of story as the *Metamorphoses*. It is an account of a farmer, who owns two *iuuenci* and is therefore a long way above subsistence level, and of how he prepares what would now count as brunch, a preparation based on unleavened bread. He has flour in store, and uses cheese, but not meat, from his store. He grows vegetables for market, but does not use them

17 Castiglione Morelli (2011), while documenting the element of uncertainty over just how big the Boscoreale gold hoard was, suggests that it represented the whole income of the estate for one year.

18 See the Introduction to the Edict on Maximum Prices of Diocletian, referred to above.

for his brunch, rather a bit of onion, chives, watercress, rocket, garlic, parsley, rue and coriander; and when he goes to market, he returns weighed down with coin, but hardly ever accompanied by wares from the urban *macellum*. The poem is not explicit, but it may be that the oil and vinegar he uses for his brunch has been bought.

I am of course aware that all literary texts, particularly poems, are constructions; but I see no reason to suppose that the author of the *Moretum* set out to construct a picture that his readers would have regarded as absurd. I am struck by the suggestion made by Kim Bowes in her chapter that Podere Terrato, to details on the coins from which I much look forward, consisted of a small garden producing like that of the *Moretum* for the market.[19]

4 Conclusion

So I still think it perverse to argue that the countryside in general participated in a vigorous monetary economy, though it is of course obvious that the gardens of the *Moretum* and of Podere Terrato were linked to markets. I should like to draw attention to a modern parallel: France between 1789 and 1914 was a powerful, modernising and centralising state; yet it took from 1803 to 1914 for the franc completely to replace other forms of reckoning;[20] and as late as 1870 many peasants only ever bought iron and salt for cash, paying for everything else in kind.[21]

And I end with a methodological point and a challenge: the argument I mounted in 1970 was based explicitly on a comparison between the velocity of circulation on a rural and an urban site, the San Rocco villa at Francolise and Pompeii, with velocity of circulation functioning as a proxy for intensity of use; and recent analysis of the evidence has shown that the latest coins to arrive at Pompeii before the eruption had taken no more than a couple of months to get there from Rome.[22]

19 See Bowes et al. (this volume); for the project in general, see Vaccaro et al. (2013) with earlier bibliography.

20 Weber (1977, 32–34).

21 Ibid., 34–36, also 131 for salt.

22 Abdy (2013); there is also a discussion of the latest gold and silver from Pompeii in Castiglione Morelli (2011); for the sestertius of Titus impressed in the plaster of the wall of the brothel, see Crawford (2012, Pompei 46). Van Heesch (2009) curiously denies that the coinage of Titus reached Pompeii. For Tebtunis, only slightly smaller than Pompeii, where coins of AD 42/3 were available by AD 46, see Rathbone (2013).

Accumulating evidence for coin finds in the countryside—ever more as sieving has become normal—serves no useful purpose,[23] since no-one has ever denied that they were there; and field survey obviously cannot provide evidence for coins from independently dated archaeological contexts. The book by Richard Hobbs that I have already mentioned is also interesting, in that it shows that in the bars of L. Vetudius Placidus and Asellina, active in the last generation of Pompeii, the coin material characteristic of the early 1st century BC has disappeared, further documenting active circulation of coin at Pompeii;[24] are there further rural sites beyond Francolise, Monte Irsi, Pievina or Scoppieto, where all or most of the coins were of an earlier period than the site. Or are there cases where the coins were of the same date as the site?

23 As by Howgego (1992, 20); von Reden (2002, 152), in misattributing to Crawford (1970) a picture of a 'thin spread of hoards in rural areas of Italy', has completely misunderstood the problem.

24 Hobbs (2013, 67).

PART 5

Conclusions

CHAPTER 17

Roman Economic Practice across Time and Space: An Outside Perspective

Gary M. Feinman

1 Introduction and Basic Research Parameters

Several decades have now passed since the formalist-substantivist debate—a paradigmatic struggle that long framed discussions of non-industrial economic history—was declared over.[1] Since that time, archaeologists and historians have begun to dissect an array of long-established assumptions and approaches that were applied to the study of our economic past and also have begun to outline fresh, cross-culturally informed perspectives on specific preindustrial economies.[2] In this essay, I build on the directions taken in these recent works and others to offer comparative vantages on current investigations and debates concerning the ancient Roman economy.

As illustrated by the chapters in this volume, scholars investigating economic production, modes of distribution, and consumption in the ancient Roman world are re-evaluating traditional presumptions, expanding the collection of new sources of data, and beginning to frame new conceptual agendas and questions. I highlight a number of key investigatory directions present in ongoing research endeavors, both outlined here as well as in other venues. Following this brief introduction, I sketch my suggestions and perspectives, starting from more empirical/descriptive matters and proceeding to more overarching/conceptual concerns. My aim is to link these bottom-up and top-down elements to weave the key dimensions of an overarching approach that has the potential to address and contribute to both diachronic and more broadly comparative concerns. At the same time, I outline connectivities between different analytical scales, reinforcing the necessity of a multiscalar perspective to study and understand economies, past and present. When it comes to the investigation of preindustrial states and early imperial economies, the

1 E.g. Halperin (1984); Isaac (1993); Scheidel and Friesen (2009); Storey (1999).

2 E.g. Blanton and Fargher (2008); Feinman and Garraty (2010); Hirth and Pillsbury (2013); Masson and Freidel (2012); Morrisson (2012); Smith (2004); Parkinson et al. (2013).

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era of purely local-centric foci and simple typological or categorical designations should be over.

In accord with arguments advanced by Storey,[3] a key tenet underpinning my commentary is that for most research issues there is not one discrete 'Roman economy'. Rather, there are different Roman economies across time and space; these economic networks define variable levels and kinds of economic behavior. Of course, at specific temporal junctures, these more localized economies were woven into larger scalar units, but the operating patterns and practices of small-scale economic networks may not have matched others of comparable scale or the principles and behaviors that systemically linked these more localized units into larger spatial networks. This perspective does not rule out or diminish the significance of macro-scale economic ties in a Roman world of imperial dimension. But it does remind us that the economic underpinnings of that world were complex, diverse, and certainly not static over time.

One of the promising trends in the study of the ancient Roman world is the growing role of archaeological investigation, particularly regional-scale settlement pattern studies.[4] Such fundamental bottom-up empirical research projects are crucial for gaining perspective on those parts of the Roman realm that lay outside or beyond coverage from ample textual sources. Nevertheless, even in those areas closer to the Roman core, and/or where the documentary records are abundant, archaeological data yield a highly informative complementary perspective that can serve as the basis for parallel yet independent insights,[5] as evidenced in other global regions.[6]

Dirt-derived archaeological assessments regarding the agricultural intensity, crop choices, and settlement patterns associated with particular landscapes are shown in this volume to provide markedly different and more nuanced patterns of past land use than long had been presumed based on sketchy documentary accounts and top-down generalizations regarding preindustrial economies. Farmers in the Roman world made variable choices and employed a range of strategies based on specific conditions and constraints. These observations are important beyond the amplification of specific cases, as they illustrate that farmers and subalterns in the past were neither uncreative automatons incapable of innovation nor forever duped in their decision making by the powerful. These findings force us to pause before accepting either the models of

3 Storey (1999; 2004); see also Paterson (1998, 164).
4 De Ligt and Northwood (2008b, 1); also in this publication.
5 E.g. Storey (1999).
6 E.g. Feinman (1997); Smith (1992).

Malthus that tend to presume the former or the frames of Marxist/substantivist thought that often rely on notions of 'false consciousness' or the application of unending despotism to explain preindustrial contexts. Rather, farmers in the Roman world appear to have had greater degrees of agency, albeit invariably constrained in certain ways, than either of those paradigmatic approaches affords.

Based on firm empirical support, the recognition in this volume that in the Roman world farming decisions and strategies varied significantly over time and space is an analytical key going forward, as it necessitates a truly multiscalar approach to the Roman past. To address investigatory agendas and research questions regarding agrarian and craft production, economic circulation and transfer, and the funding of power requires empirical vantages that extend well beyond the ample and diverse array of historical documents to excavations in diverse contexts and especially expanded coverage through archaeological settlement pattern surveys wherever such studies are still logistically feasible.

2 Beyond Categorical Frames

Underpinned by archaeological findings, scholars are reassessing traditional notions of Roman economic practice and change during the last centuries of the Republic.[7] Many of the assumptions and prior empirical foundations that long have girded the interpretation that transitions during the Late Republican era coincided with a major reconstructing of the Roman countryside from small-scale farming to large slave-maintained estates or villas are presently being reconsidered and modified to accommodate evidence of region-to-region diversity and synchronic variation within specific regions. In part, these re-assessments reflect a new perspective on Roman Republican-era farming practices that recognizes both the richness of the Mediterranean resource base[8] and the recursive relationship between labor inputs and agrarian productivity for human landscapes in which water management, manure applications, terracing, and other agrarian strategies foster marked increments in yields as long as the essential labor investments are regularly maintained.[9]

7 E.g. De Ligt and Northwood (2008b); Kron (2008a).

8 Kron (2008a).

9 E.g. Brookfield (1984, 36); Fisher and Feinman (2005).

The growing recognition that diverse agrarian production practices were maintained across this time, including the persistence of small land holders, is significant as it forces the revision of long-held models that presume direct state (political) control of the later Roman economy. Both agrarian and craft production were not entirely concentrated in estates and factories at this time, and so direct political planning and management of economic production and distribution would have been nearly impossible.[10] The friction of distance and the checks on centralized power were both sufficiently strong to prevent tight, top-down economic control. The expanding evidence for the importance of marketplace exchange[11] coincides with this view, as modes of transfer beyond centralized redistribution clearly were significant.

Based on my reading of these sources, I stress that Roman economic practice was anything but 'free' of governmental constraints, taxes, and intersections. But no economy in human history (even modern capitalist ones) has ever operated without degrees of cultural and political embeddedness.[12] So those of us who recognize that economic behavior is always intertwined with and affected by political, cultural, and institutional contexts must cease the application of false metrics to past economic practices. In other words, the diminishment of the role and importance of marketplace exchanges because such economic transfers are entangled with political and social constraints represents an analytical error and mischaracterization of how market economies vary and function.[13]

As Paterson[14] and Flohr[15] both have noted, traditional positions derivative from the old-line primitivist/substantivist frames still retain a strong presence in debates over the Roman economy. On the one hand, taxes, tribute, governmental regulation, and the use of political clout in economic matters are integral parts of contemporary economic systems that we would all comfortably refer to as market based or capitalist. Yet when we find these features and characterizations in the past, they become the rationale to segregate ancient production, circulation, and consumption networks, such as Rome's, into categorical modes, such as 'command or redistributive economies'. Unfortunately, when employed in this manner, such categories have little, if any, descriptive or analytical utility for understanding the variability or processes of change

10 See Feinman and Nicholas (2012) for a parallel argument concerning prehispanic Oaxaca.
11 De Ligt (1993); Greene (1986); Paterson (1998); Storey (2004); Temin (2013).
12 Feinman and Garraty (2010); Granovetter (1985); McCloskey (1997).
13 Lie (1991; 1997); Wilk (1996).
14 Paterson (1998, 157).
15 Flohr (2014, 690–691).

that span humanity's economic career. They are even less useful when we endeavor to explain the significant diversity that now is evident in preindustrial economies.[16]

The reality that at any one time or, for that matter, across time there was not one set of practices, rules, parameters, or means of transfer to define economic behavior in the Roman world further limits the analytical utility of assigning the 'Roman economy' or any other to a particular, discrete mode or category from which basic attributes are then assumed. At a fundamental level, whether one's scholarly interest is focused on ancient Rome or preindustrial economies more comparatively, the key questions revolve around how specific economies worked, how/why practices, relations, flows, and networks changed, how different means of economic transfer were intertwined, and how these economic actions relate to other spheres of life, such as the funding of governments and power, the stratification of access, the economic underpinnings of gender relations, etc. The investigation of such research queries require in-depth analyses grounded in data on agricultural production, demographic change, the scale and intensity of craft manufacture, flows of various resources and products, domestic consumption patterns, taxation practices, and an array of additional variables.[17]

From a comparative perspective (whether over time or space), reframing examination of ancient economies in this way (with a focus on the aforementioned queries) allows for the investigation of intermediary levels of analysis that focus on causal linkages between key variables or what has been conceived of as social mechanisms.[18] This approach sets sights on theoretically explicable connections that are an interpretive middle ground between law-like (or categorical) propositions and descriptive approaches intended to account only for specific cases. Starting from a slightly different vantage, Blanton and Fargher endeavor to carve out a similar analytical "middle path between a 'homo economicus' perspective of methodological individualism, on the one hand, and normative determinism, on the other."[19] The aim is to dissect the patterned relationships between variables in a range of contexts that also are subject to historical contingency.

For example, the chapters in this volume critically broaden Scheidel's perspective on shifts in the tempo of Roman economic growth during the Late

16 E.g. Smith (2004).
17 E.g. Greene (1986); Smith (2004).
18 E.g. Hedström and Swedberg (1996).
19 Blanton and Fargher (2009, 135).

Republican and Early Imperial eras that bears important parallels to the socioeconomic mechanisms outlined cross-culturally by Blanton and Fargher.[20] Scheidel views preindustrial economic growth as basically stable and constrained by Malthusian forces. Growth episodes are seen as spurred by idiosyncratic factors (such as the availability of war booty). But once the particular forces that promoted this one-off or specific episode have past, Malthusian forces catch up and constrain the expansionary forces. Yet from a broader comparative perspective, the kinds of resources and modes of economic transfer that underpin power can directly affect how power is wielded.

Factors such as the concentration of production, the nature of the resource base that sustains governance, the pace and distribution of public goods expenditures, the distribution of wealth and political voice all are key parts of this analytical equation. In larger societies, such socioeconomic factors must be considered, as the fruits of economic growth are rarely, if ever, evenly disbursed.

What is, perhaps, counterintuitive but provocative about Heinrich's (this volume) discussion is the argument that with some Imperial-era consolidation of land and more concentrated production in villas, the proportion of taxes derived from small-holders was diminished (though not eliminated), which prompted an erosion in the value of citizenship as the small-scale producers lost voice and economic clout. The diminishment of the rights and voices of commoners in turn lessened (governmental) commitment to expenditures on localized public goods. Growth slowed as spending on public goods declined. At the same time, political power and wealth became more consolidated as elites disconnected from their local populace. Conspicuous consumption by elites increased. In contrast, the broadened agrarian tax base that was in place centuries earlier, when rapid growth was kindled, coincided with meaningful and distributed citizenship, resource allocations for urban dwellers in Rome and beyond, and a greater willingness to spend on local public goods. The later expenditures, including road building and other enhancements to communication and commerce, in turn spurred economic growth. Military expansionism and the collection of booty also may have contributed to growth in some ways, but the expenses also competed for (and likely deflected) governmental expenditures on local public goods, while also funneling free-floating resources[21] directly to a narrow few, thereby eventually promoting the concentration of wealth.

20 Scheidel (2009); Blanton and Fargher (2008).

21 Eisenstadt (1963).

These socioeconomic mechanisms or relations between variables that often are ascribed to the Roman world (and are discussed in this volume) are aligned with broader patterns illustrated consistently in the comparative sample of preindustrial societies studied by Blanton and Fargher.[22] At the same time, these linkages and interpretations run directly counter to both doctrinaire neoliberal and Marxist perspectives that frame government revenue collection as both essentially burdensome for individuals and necessarily deflective of economic growth. Such top-down grand narratives (Witcher, this volume) fail to see that in many, though certainly not every case, the payment of taxes has a role in ensuring that the voices of those with little or no power are not entirely ignored. If maltreated subalterns 'vote with their feet' or slack off in the intensity of their agrarian investments, state revenues potentially are lost or diminished. But when governance is funded through the control of spot resources, trade routes, or other direct means that do not require contributions/taxes from local subalterns, those in power tend to consolidate it.

In their cross-cultural historical sample of preindustrial states and empires, Blanton and Fargher[23] elaborate the links between the financing of governance primarily through the exaction of internal resources (such as local farming), expenditures on public goods, expanded investments in bureaucratic infrastructure, and more collective forms of governance/rule. Alternatively, heavy reliance on external funding sources, more susceptible to monopolized control, is linked broadly to greater concentrations of wealth and power and lesser expenditures on public goods.

These political-economic mechanisms frequently have causal linkages that tie economic growth and increases in prosperity to demographic expansion. Migrations due to pull factors tend to follow economic expansion and opportunities. Access to human labor is a prime basis of political power in preindustrial contexts, especially when power and governance are funded through internal sources.[24] In fact, for preindustrial states and empires, efforts to attract population, and so labor, were seemingly a far more central and common concern than Malthusian population pressures. As Rambo opined: "If population pressure was a problem in the Nile Valley, a circumscribed situation, *par excellence*, the Pharaoh should have been delighted to see the last of Moses and his cogeners. That he was not, and indeed expended considerable effort to retain the

22 Blanton and Fargher (2008, 254; 2009); see also Levi (1988).

23 Blanton and Fargher (2008).

24 E.g. Feinman (1998); Geraghty (2007, 1047–1048).

Jews within his territories, suggests that population pressure was not perceived as a threat to social stability."[25]

3 Defining Global-Scale Processes

As a consequence, globalization, which itself encompasses a diversity of meanings and processes,[26] cannot be modeled as having a uniform effect on economic (or for that matter, cultural) processes. For example, given the socioeconomic mechanisms outlined above, the opening or expansion of external markets for local production activities (in a context where governance is funded primarily through taxes or other transfers from the local economy) may foster growth and stimulate expenditures on infrastructure. Alternatively, shifts in the funding of governance and power from internal to external sources, potentially including extractions from mines, trade monopolies, and the amassment of the spoils of war, may have alternative implications, lessening the voice and citizenship of local subalterns, curtailing local growth, fostering inequality, and promoting the concentration of power.

Similar changes (and variations over time) characterize segments of long-term Roman history, so that causal propositions that link globalization to the countryside must strive to provide precision in the nature of the networks and transfers that traverse broad spatial scales in order to achieve understanding. Thus, while the ebbs and flows of extra-regional connectivities are undoubtedly a key consideration for understanding economic process,[27] equally critical are the specific kinds of the external linkages. Across history, episodes of globalization have taken a diversity of paths;[28] to explain and compare them requires that we dissect the mechanisms and processes of interconnection.

In sum, the enhanced integration of archaeological and historical sources toward the study of the Roman past is bringing greater materiality to this enterprise, while also opening new vistas to spatial and temporal diversity. The availability of finer grain information (and its resultant diversity) along with the greater opportunity to examine multiple scales of analysis is demanding revised conceptual frames that accommodate spatial and temporal diversity while integrating spatial scales. As is evident in this collection and other

25 Rambo (1991, 49).
26 E.g. Al-Rodhan and Stoudmann (2006); Kearney (1995, 548).
27 E.g. Stek (2014).
28 Hall (2014).

recent works, these ongoing advances are pushing scholarship away from long-standing and rigid categorical constructs that have framed decades of debate over ancient economies. These breakthroughs yield new opportunities to recognize and define key socioeconomic mechanisms in the ancient Roman economic world, as well as how these relations shifted over time and space. Debates[29] over appropriate comparative parallels are now underway,[30] and new insights derived from even broader comparative efforts have been achieved[31] with hopefully more in-depth efforts soon to follow.

29 Flohr (2014, 690).

30 E.g. Bang (2008); Temin (2013).

31 E.g. Blanton and Fargher (2008); Fang et al. (2015).

CHAPTER 18

Landscape Archaeology in Italy: Past Questions, Current State and Future Directions

Peter Attema

1 Introduction

Over the past decades, landscape archaeology has developed into an important sub-discipline of Mediterranean archaeology, enjoying a steadily growing number of practitioners working in interdisciplinary projects in many countries around the Mediterranean. Of these, Italy is arguably the best researched country with regard to the Greek Colonial and Roman countryside, boasting a long and rich tradition in systematic topographical fieldwork going back to the early 20th century. From the outset, landscape archaeological research in Italy has operated at the forefront of methodological innovation, broadening its basis from topographical studies of past landscapes via systematic field surveys to a more holistic archaeological approach, most notably through the inclusion of geophysical prospecting, the excavation of selected rural contexts, research of infrastructure and increasingly also bio-archaeological research on rural sites.

The long research history and increasing methodological sophistication currently allow scholars to ask new questions about the Roman economy, demography and social structure at the local, regional and interregional scales and their interaction using large and well-organized datasets. It is therefore no coincidence that the initiative for the conference '*Rural communities in a globalizing economy: new perspectives on the economic integration of Roman Italy*' comes from scholars with a background in Italian landscape archaeology. While De Haas and Tol use a modern landscape archaeological field perspective as the point of departure in their study of minor rural centres in the Roman economy, their overall research strategy also encompasses other useful tools and theories, such as network analysis to model economic geography and archaeometric research to investigate patterns of production, distribution and consumption.[1]

1 See the contributions of both in this volume, as well as De Haas et al. (forthcoming), Tol and Borgers (2016) and Borgers et al. (2016).

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Similarly, the papers brought together in this volume, ranging in scale from the individual farmstead to the Roman Empire as a whole, show how in current scholarship on the Roman economy, various topics and methodological approaches seamlessly converge. They present diverse, yet rich and detailed approaches that allow both quantitative and qualitative analyses from the local to the global scale.

In this concluding chapter, I will briefly reflect on Italy's rich landscape archaeological tradition in order to point out the potential of the archaeological data that has been compiled since the late 19th century. I will then discuss the implications this has for the current state of the study of the Roman rural economy in Italy as illustrated in the contributions in this volume. Finally, I will reflect on future directions for the field that will demand archaeologists and ancient historians to work shoulder to shoulder.

2 The Development of Landscape Archaeology in Italy

From its inception at the beginning of the 20th century, the systematic inventory of Italy's rural landscapes carried out within the framework of the *Forma Italiae* series has provided the academic community with an astounding insight into the rich Roman rural heritage.[2] The first two map sheets published in the 1920s were dedicated to the Pontine region and compiled by the series' prime promoter, Giuseppe Lugli. These maps at the time revealed a dense distribution of Roman villas in the landscapes around the Roman towns of Terracina and Circeii; funerary monuments lining the Via Appia as well as harbours, canals and roads.[3] Lugli's early documentation of the Roman rural past is particularly valuable as many sites at that time still contained standing architectural remains. The maps, photographs and descriptions evoke an image of what once must have been a very busy Roman countryside. Other Forma Italiae volumes have since added valuable data on Roman period rural landscapes in various parts of modern Italy. Most of these inventories were compiled at a moment in time when interventions to facilitate mechanized agriculture were becoming more invasive. In many cases these interventions proved to be devastating for the survival of any standing remains, while subsequent levelling and deep-

2 http://www.formitaliae.it/fi/storiaprogetto.html. See also Cambi and Terrenato (1994, 25–30); Waarsenburg (1998, 40–41). Between the first publication and today, archaeologists throughout Italy have compiled almost 50 volumes.

3 Lugli (1926 and 1928).

ploughing affected the integrity of foundation walls and subsurface structures. Continued ploughing then reduced such sites to little more than extensive surface scatters of building materials and pottery. The early Forma Italiae map sheets as well as similar regional and local initiatives are therefore important documents for our knowledge of the Roman rural economy.

Over the last half-century these topographical inventories have been supplemented by data from intensive systematic surveys, which in general investigate much smaller areas by systematic field walking using standardized collection methods on available fields. While topographical inventories are especially, but by no means exclusively, suited to record more obtrusive remains that are scattered over large areas, such as ancient roads, Roman villas and cisterns, intensive systematic surveys typically produce detailed site-related and artefactual data that allow us to identify diachronic changes in settlement, in addition to enabling the registration of small sites, off-site pottery distributions, and empty areas.[4]

A number of long-term projects, such as the South Etruria Survey,[5] the *Suburbium* project and the Pontine Region Project in Central Italy,[6] and the Metaponto project in Basilicata in South Italy,[7] have produced a wealth of information on Italy's ancient countryside, providing insight into the economy of the classical countryside and its relation to Greek and Roman urban centres on an unprecedented scale. Apart from these flagships of landscape archaeology, many more large and small survey projects, often international and interdisciplinary, have delivered (or are still delivering) precious data for comparative reconstructions of rural societies in ancient Italy and their economic integration into the Roman world. Full and detailed publication of survey data, however, is a *sine qua non* for achieving this goal.

3 Implications and Current State of the Field

Although methodologically challenging, scholars have recently begun to tap into this huge reservoir of systematically collected field data on a national scale in order to tackle issues such as Roman demography and colonization

4 See Attema et al. (2011) for a prime example of an integrated study.

5 Potter (1979); Patterson (2004); Patterson and Coarelli (2008); Patterson et al. (forthcoming).

6 For the Suburbium project, see Carandini et al. (2007) and Capanna and Carafa (2009). For the Pontine Region Project: Attema et al. (2010).

7 Carter (2006); Carter and Prieto (2011).

of the ancient countryside.[8] In the same vein, regional comparative studies show great potential with regard to the advancement of our knowledge of Hellenistic and Roman settlement, particularly in the application of landscape archaeological data to the study of *longue* and *moyenne durée* changes in land use and economy.[9] To achieve these goals, datasets are needed that comprise not only systematically collected data on various types of rural habitation sites, but also information on food and craft production, gleaned from a systematic collection of artefacts and ecofacts.

Such approaches, for instance, have led to a change in our perception of the socio-economic organization of the late Republican and early Imperial countryside, which for a long time was dominated by views conveyed from the ancient written sources. The traditional image that came forward from early excavations and topographic surveys was that of a landscape occupied predominantly by large estates. This supported the historical scenario of a severe reduction in the number of peasant farms in the 3rd/2nd century BC due to usurpation of peasant landholdings, a process that supposedly led to large-scale specialized production for an urban market.[10] However, while specialization and large-scale production did occur, the results of intensive surveys indicate that the Roman rural landscape actually continued to comprise a variety of rural sites ranging from the traditional modest-sized farmstead to the (large) *villa rustica* or *villa maritima*.[11] Clearly, new insights from landscape archaeology have consequences for the way in which we view the rural economy of a given landscape: as highly specialized, with a focus on large-scale production of grain, olives or wine to feed Rome; or rather as more diversified, a landscape in which specialized production co-existed with peasant farming, and self-sufficiency with small-scale surplus production for local markets. In his spatial analysis of social and economic developments in the countryside of Roman Italy, Launaro draws attention to the fact that many late Republican villas were established in areas peripheral to urban centres that still offered opportunities for investment in land, and that Roman villas near cities and towns did not necessarily monopolize the best agricultural land by driving out the free peasantry.[12]

8 For general remarks, see Alcock and Cherry (2004b), Attema and Schörner (2012). For more detailed case studies, see Launaro (2011a) and Pelgrom (2012).

9 Attema et al. (2010, 160–169).

10 See for example Toynbee (1965); Finley (1973); Hopkins (1978b).

11 Dyson (1992, 137).

12 Launaro (this volume).

As to agricultural production, one of the main topics addressed in this volume, landscape archaeologists too often implicitly assume that their recorded sites, whether large or small, were involved in cereal farming, horticulture and the production of wine or olives. As is indicated by two contributions to this volume, specialized animal husbandry, or so-called convertible agriculture, i.e. alternating crops and grazing on a given piece of land, constitute perfectly feasible, alternative agricultural strategies.[13] Intensive surveys that systematically record off-site pottery distributions may be of help in the interpretation of food production strategies.[14] Off-site pottery in fields surrounding a Roman site may point at arable farming, based on the assumption that in Roman and Greek rural areas household waste was applied as a fertilizer. Such refuse would occasionally contain potsherds that had ended up on the dung heap and from there were scattered over the nearby fields.[15] However, as recent work by the Roman Peasant Project has shown, we must avoid generalizing interpretations, and instead try to reconstruct local rural landscapes in detail.[16] The Roman Peasant Project's excavations of small surface scatters suggest that these may represent a range of features, such as agricultural drainage channels, threshing floors and other agricultural facilities in which building materials or terracotta objects were (re-)used.[17] Archaeologists must realise that standardized interpretation of such small pottery scatters, as for example ephemeral habitation sites, may introduce errors in site classification, and by extension also in socio-economic reconstructions and population estimates.

However, the reverse situation, i.e. an absence of off-site pottery around a rural site, does not automatically imply the practice of animal husbandry. There are other scenarios in which no off-site pottery scatters are formed, for example when the application of a fertilizer was not deemed necessary or where domestic refuse was neatly sorted into organic and inorganic components, saving up the latter for other purposes (building/repairing floors and drains, filling potholes in roads etc.). Animal husbandry (for dairy products, wool, meat, traction) may also have been practiced further away from the site, beyond the cultivated areas, for example in uplands or on marginal land, whilst still being an integral part of the rural economy of a given landscape.[18]

13 Bowes et al. (this volume) and Kron (this volume).
14 De Haas (2012).
15 Wilkinson (1982); Bintliff and Snodgrass (1988).
16 The same thesis was argued earlier by Alcock et al. (1994).
17 See Bowes et al. (this volume). Excavation of off-site features appears to be particularly helpful when it comes to gaining information on agricultural technology.
18 Veenman (2002); Halstead (2014).

Several contributions to this volume make clear that archaeobotanical and archaeozoological data are indispensable in the reconstruction of agricultural practices; it is important to keep in mind that the potential of an integration of such studies into landscape archaeology has not yet been fully acknowledged. Some landscape archaeological projects omit pollen analysis from their field strategies, despite it being an excellent tool to reveal human impact on the regional landscape on the basis of changing vegetation patterns, to detect and roughly date the introduction of certain types of arboriculture (chestnut, olive, grape vine), or to estimate the intensity of cereal farming in a given region.[19] That being said, although pollen analysis can provide invaluable information on a regional scale, it does not provide detailed insight into local agricultural regimes. The results of archaeobotanical studies applied to the rural contexts studied by the Roman Peasant Project are therefore an important illustration of the importance of obtaining data on peasant agricultural strategies. They demonstrate the necessity of excavating a range of rural contexts in order to understand what it is our detailed intensive surveys show us. As such, they make a strong case for the inclusion of test excavations in landscape archaeological research to collect types of data that surface surveys cannot provide. The ecological data collected by the Roman Peasant Project suggests the adoption of a flexible agricultural strategy, possibly convertible agriculture, by the peasants of inland southern Tuscany. This particular case, from an area peripheral to any urban centre, may well be typical of more remote areas, while more specialised and market focused agricultural strategies can be expected nearer to towns. Once more detailed examples of similar research carried out in different geographic zones become available, it will be interesting to compare them and look for meaningful patterns in agricultural strategies in relation to landscape types and distance to urban centres, and to evaluate possibilities to extrapolate such observations.

However, besides agricultural production and animal husbandry the rural environment offered many other profitable opportunities. As Kron points out, fish farming[20] and (probably) game farming were viewed as highly profitable activities in antiquity. Equally, forestry offered considerable economic potential. Although activities related to this can hardly be traced by landscape archaeological methods (pollen diagrams may yield information on woodland increase or decrease), charcoal burning can occasionally be detected. In her contribution, Veal points out the substantial market demand for this commodity.

19 Van Joolen (2003).

20 Kron (this volume); Higginbotham (1997).

One of the most ancient and widespread commercial activities taking place in the countryside must have been craft production, a second central theme of this volume. Craft activities could be variously organized, from more modest modes of production to an almost industrial scale, and landscape archaeologists need to be aware of where in the landscape such activities may have taken place. Additionally, they should know what information we may draw on as potential material correlates, and what methods we use at our disposal to investigate and interpret the actual sites and finds as well as the scale of production; these issues have been clearly outlined in Peña's contribution on the study of rural craft production in Roman Italy. When viewed from this perspective, it is highly recommended that landscape archaeological projects incorporate specialists that are able to recognize any meaningful elements in the surface record that may point to craft production.

The study of craft production benefits from recent methodological advances, especially the application of geophysical mapping to complement surface surveys. However, the site of Podere Marzuolo demonstrates that additional field methods are sometimes needed for a more detailed investigation of surface sites with signs of possible craft activity.[21] Here, once again the Roman Peasant Project used geophysical methods, followed by excavation that led to the identification of evidence for the production of both experimental and standardized Italic Terra Sigillata. This discovery is of great importance to our understanding of fine ware production in areas far from large urban production sites such as Arezzo and Pisa. At the same time, this particular example should make us realize that our current knowledge of pottery production and craft production in general in the context of regional landscapes is in fact still very limited.[22] The discovery, mentioned in the contribution by Veal, of a mid-Republican charcoal production area and village at Valmontone in Lazio, is a clear example of how much there still is to discover when it comes to rural production activities, if only we look in the right places, use the correct methods and work on an appropriate scale.

Finally, there is a growing interest in rural central places in the context of re-assessing existing models of the Roman economy, which tend to overemphasize the role of large urban centers in regional and interregional exchange.[23] Indeed, rural central places (such as *fora, stationes* and rural sanctuaries) played an important role in complex pre-industrial societies as nuclei

21 Vaccaro et al. (this volume).

22 See Tol and Borgers (2016) for an example of such a regional approach.

23 Tol et al. (2014).

of production and commodity exchange, as can also be gleaned from ethnographic and historical comparative studies.[24] Santoro points to the fact that research into the economic role of minor settlements in transalpine regions (e.g. France, where the subject is well developed) is a welcome source of comparative material for a study of Italian regions where in the Roman period this form of territorial and economic organization was pioneered.[25] Her two case studies on Roman Abruzzo and Friuli shed some light on the fundamental role of minor settlements on the Adriatic coast as centers of craft production and distribution and as entrepots on routes to other (mainly coastal) markets. Santoro explicitly mentions the contribution of field surveys, in particular intensive surveys like the *Iuvanum* survey and the Sangro Valley project, which in the case of the Abruzzo gathered important new data. A current hypothesis states that minor centers were an important interface between urban and rural economies, between producers and consumers, and between local, regional and overseas markets, as also suggested by the locational analyses presented by De Haas. Various papers in this volume, grouped under the central theme of commercialization, indeed attest to the complex and fluctuating relationships between local, regional and interregional demands of commodities as exemplified in the papers dealing with fine-ware and amphora production in northern coastal Etruria, wine production and consumption in Picenum, and amphora production in the Bay of Naples.[26] Minor settlements most certainly functioned as important nodes in these complex economic networks, but archaeologically the site category still remains insufficiently studied in many parts of Italy.

4 Future Directions

The widespread application and increasing methodological sophistication of archaeological surveys is providing the academic community with raw data to put the often binary historical models to the test: as is currently happening in, for example, the low and high-count demographic debate,[27] or in related discussions on the increase or decline of the rural free population.[28] On the

24 Smith (1974); Feinman and Garraty (2010).

25 Santoro (this volume).

26 For these topics see Pasquinucci and Menchelli (this volume); Van Limbergen et al. (this volume) and Olcese (this volume).

27 Recently De Ligt (2012a); Hin (2013).

28 Launaro (2011a).

other hand, the present volume demonstrates that from an archaeological point of view, artefact surveys, although crucial, are in themselves insufficient to tackle the big socio-economic themes outlined earlier in this paper. Each of these themes asks for integrated methodologies that combine survey, geophysics, coring, excavation, ecological studies and archaeometry, to produce enhanced datasets with which aspects of the Roman economy (agricultural production, crafts or processes of commercialization) can be reconstructed. Moreover, while Roman agriculture indeed spread out over all coastal landscapes and major river valleys of Italy, this was far from a uniform process in space and time and we need to study and compare its regionally dynamic and varied nature.[29] As an example I mention the mosaic of landscapes in the Pontine Region, each with its distinct local developments that are closely tied to landscape characteristics and dynamics.[30] Recent work by the Minor Centres Project has revealed, for example, that apparently rapid changes in landownership, agricultural regime, labour investment and local entrepreneurship occurred in the Pontine plain during the mid-Republican period. Similar fundamental socio-economic changes may have occurred more slowly in other landscapes in the Pontine Region and may have been more firmly rooted in older patterns. To understand the varied nature of these changes we need to invest in interdisciplinary research on a local scale. What did the farms in various local contexts actually look like? What was the role of hydrological technology in agricultural upscaling, and what was the balance between animal husbandry and arable farming? What changes occurred in crop selection?[31] A growing interest among archaeologists in these aspects of the Roman rural economy, in combination with advances in archaeometric research, geophysical prospection and off-site archaeology, is currently bringing into focus the importance of crafts and industry in secondary settlements and rural contexts.

Today, many long-term survey projects studying entire coastal plains, river valleys and upland areas are supplying the raw data for studies on how rural communities were connected at the local, regional and supra-regional scale, and how such connections changed over time. In this process, studies of infrastructure are of paramount importance, as both Rob Witcher and Tymon de Haas emphasize, and should be prioritized in fieldwork at a local scale to see how regions were interconnected. Remote sensing techniques (including geophysical prospection) and sophisticated applications of GIS are instrumental in revealing the nature of links between local infrastructure and regional

29 Di Giuseppe (2005); Witcher (2006a); Launaro (2011a).

30 Attema and De Haas (2005); De Haas (2011).

31 See Heinrich (this volume).

networks. As Gijs Tol shows in his contribution, when combined with ceramic research they may reveal the processes, and their spatial and temporal variations, whereby roads, rivers and harbours facilitated the flow of commodities between communities at a local, regional and supra-regional scale.

As stressed by Jongman in this volume, the increase in the quality and quantity of available information gives landscape archaeological data an increasingly important role in the study of the Roman economy: a field of study that used to be the domain of ancient history and classics, but is now increasingly an interdisciplinary field involving ancient historians and archaeologists. Of the several approaches currently practiced, one involves aggregating landscape archaeological data into a model of economic growth and decline, economic integration and rural demography.[32] A number of such studies have successfully come up with new insights into the socio-economic reality of the Roman economy, but there is great potential in specialist comparative micro- and macro-analyses of economic data collected in a range of surveys in Italy and beyond. Collating large field survey data sets and making the resulting databases available for analysis, while undeniably a highly challenging task, is the next step that landscape archaeology should take to increase its relevance. Likewise, a greater focus on aggregating ecological data to study actual agricultural strategies will be an important step forward. This means that excavation of a selection of rural sites will have to be incorporated in landscape archaeological projects on a more regular basis in order to obtain the necessary contexts for sampling. Furthermore, in studies of production and consumption, landscape archaeology has in the last decade come into its own, furnishing factual information on the importance of rural production facilities and the distribution of artefacts over the countryside in addition to enabling analysis of rural consumption patterns and rural access to local, regional and interregional supply lines.[33] Apart from particularization and quantitative adjustment of the overall picture, landscape archaeology can also contribute to a more qualitative approach of Roman economy. This can be achieved through in-depth studies of local situations; more specifically, the economic strategies adopted by farmers and the nature of their landholdings (including rural facilities, agricultural infrastructure and material culture), and how these relate to information gleaned from ancient written sources. Here, the interests of archaeologists and ancient historians once again coincide.[34]

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32 Launaro (2011a).

33 Witcher (2006a); Vaccaro (2011); Tol (this volume).

34 See for example Kron (this volume).

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